012975

United States Department of Energy

Savannah River Site

Record of Decision
Remedial Alternative Selection for the
T Area Operable Unit (U)

CERCLIS Number: 96

WSRC-RP-2004-4070

Revision 1

September 2005

Prepared by:
Westinghouse Savannah River Company LLC
Savannah River Site
Aiken, SC 29808

Prepared for U.S. Department of Energy under Contract No. DE-AC09-96SR18500

DISCLAIMER

Printed in the United States of America

Prepared for
U.S. Department of Energy
and
Westinghouse Savannah River Company LLC
Aiken, South Carolina

DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION (U)

T Area Operable Unit (U)

CERCLIS Number: 96

WSRC-RP-2004-4070
Revision 1

September 2005

Savannah River Site
Aiken, South Carolina

Prepared By:

Westinghouse Savannah River Company LLC
for the
U. S. Department of Energy under Contract DE-AC09-96SR18500
Savannah River Operations Office
Aiken, South Carolina

(This page intentionally left blank)

DECLARATION FOR THE RECORD OF DECISION

Unit Name and Location

T Area Operable Unit

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number: OU-96

Savannah River Site

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Identification Number: SC1 890 008 989

Aiken, South Carolina

United States Department of Energy

The T Area Operable Unit (OU) (TAOU) is listed as a Resource Conservation and Recovery Act (RCRA)/CERCLA unit in Appendix C of the Federal Facility Agreement (FFA) for the Savannah River Site (SRS). The FFA is a legally binding agreement between regulatory agencies [United States Environmental Protection Agency (USEPA) and South Carolina Department of Health and Environmental Control (SCDHEC)] and regulated entities [United States Department of Energy (USDOE)] that establishes the responsibilities and schedules for the comprehensive remediation of SRS. The TAOU includes or will address all the OUs in T Area currently listed in Appendix C of the FFA, all T Area Site Evaluation Areas (SEAs) in Appendix G.2, and T Area building slabs (Table 1). Some units in T Area are addressed under a separate Record of Decision (ROD) or Explanation of Significant Difference (ESD). This ROD discusses the remaining portions of the TAOU not previously addressed under other remedial or removal activities.

Units or materials to be addressed under this ROD include:

- Soils excavated under removal actions from the Outfall Delta and Inner Swamp, the X-001 Outfall Drainage Ditch OU, and Tile Field #2 that were stockpiled in the industrial portion of T Area.

- Residual soil contamination in the Outfall Delta and Inner Swamp.
- Residual soil contamination in the TNX Burying Ground (TBG).
- Residual concrete contamination at remaining building slabs.
- Uncertainties with potential and residual under-slab soil contamination.

Based on previous studies or actions, there is no problem warranting action or no further action is warranted for the following elements under this ROD:

- The Swamp High Ground and Outer Swamp subunits of the TNX Outfall Delta.
- Residual soil at the X-001 Outfall Drainage Ditch (after the removal action under the Removal Site Evaluation Report [RSER]/Engineering Evaluation/Cost Analysis [EE/CA]).
- Tile Field #1 and Tile Field #3.
- Residual soil at Tile Field #2 (after the RSER/EE/CA removal action).
- TNX Area Process Sewer Lines.

The TAOU SEAs have been previously approved for No Action. Groundwater is being administered under the TNX Area OU ROD; the groundwater corrective action will continue as specified in that document. Buildings 679-4T and 678-7T are not included in this ROD. These buildings have been dismantled and the remnants are under the footprint of Building 678-5T. This places them within an active use area and any further study will be conducted after the area is no longer active.

The response action identified in this ROD will not affect the remedial actions of OUs in other areas at SRS. The response action will not affect the other remedial actions

identified at T Area except that the riser pipe on some vapor extraction wells and air stripper recovery wells will need to be extended and installed through the proposed cap.

Statement of Basis and Purpose

This decision document presents the selected remedy for the TAOU, located at the SRS near Aiken, South Carolina. The remedy was chosen in accordance with CERCLA, as amended by the Superfund Amendments Reauthorization Act, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the Administrative Record File for this site.

The SCDHEC, USEPA, and USDOE concur with the selected remedy.

Assessment of the Site

At the TAOU, there has been a release of hazardous and radiological substances into the environment. This has resulted in contamination of soil and sediment. Soil contaminants include mercury, tetrachloroethene, a polychlorinated biphenyl (PCB-1260), cesium-137, and uranium/thorium decay chain radioisotopes (including actinium-228, lead-212, radium-228, thorium-228, thorium-232, thorium-233/234, uranium-233/234, uranium-235, and uranium-238). Sediment contaminants are comprised of uranium/thorium decay chain radioisotopes (actinium-228, lead-212, radium-228, thorium-228, uranium-233/234, uranium-235, and uranium-238).

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants or contaminants into the environment.

Description of the Selected Remedy

The selected remedy is to place a low permeability cap over contaminated soils, stockpiled soils, and building slabs in the T Area industrial area, to treat contaminated

soil in the T Area swamp using soil amendments, and to manage the TAOU area using access and land use controls.

Future land use at the TAOU is industrial and industrial buffer zone. Unrestricted land use is inappropriate due to the presence of contaminated soil, buried contaminated debris, and maintenance requirements for remedial structures (an engineered low permeability cap).

The selected remedy for the TAOU is Alternative 2: Dispose Staged Wastes Onsite, Cap Residual Contamination, Place Soil Amendments in Outfall Delta and Inner Swamp, and Implement Institutional Controls.

The selected remedy entails the following:

- Low permeability cap: The TAOU low permeability cap will cover disseminated residual contamination in soil, contaminated debris and building slabs left in place, and contaminated soils excavated from T Area facilities under previous removal actions and staged for placement beneath the cap. The cap will serve to prevent exposure to human and ecological receptors and to restrict leaching of contaminants to groundwater. A cap utilizing geosynthetic material with an effective soil hydraulic conductivity of $\leq 1 \times 10^{-8}$ cm/sec will be used to meet the remedial objectives. The TAOU portion of the cap will cover approximately 3.3 hectare (ha) (8.2 acre [ac]). It will be integrated with the TNX Area OU cap to form a single engineered structure. The finished cap will cover approximately 3.8 ha (9.4 ac).

- Soil amendments: Soil amendments will be placed in the Outfall Delta and Inner Swamp to attenuate the leachability of radiological contaminants in soils. Soil amendments will be reapplied if long-term monitoring indicates that they are losing their effectiveness.

- Site maintenance: Site maintenance will consist of inspections of the OU, low permeability cap, and maintenance of drainage features to minimize the formation of

large gullies. Minor earthwork will be performed as needed to repair any erosion damage that may occur. Site maintenance will also include mowing.

- Access controls: Access controls will include security measures such as posting and maintenance of warning signs. Signs will be posted around the OU with a legend warning of the hazard. They will be posted at appropriate locations in sufficient numbers to be seen from any approach. Administrative controls (land use restrictions) will be implemented to restrict human exposure to contaminants remaining at the unit.

- Land use controls (LUCs): The LUC component of the remedy will protect against: 1) disturbance of the soil overlaying the cap, 2) changes in grade that would interfere with storm water runoff from the cap, and 3) receptor exposure to residual contamination in the TNX Outfall Delta, Lower Discharge Gully, and Swamp OU (TNXOD OU).

This remedy would take less than one year to construct and protection would be immediate. CERCLA ROD remedial action reviews will be conducted every five years to ensure that the selected remedy is still protective of human health and the environment.

The TAOU is within the Savannah River watershed. Under the overall site management strategy, all source control and groundwater OUs within this watershed will be evaluated to determine their impacts, if any, on the associated streams and wetlands. SRS will manage all OUs to mitigate impact to the watershed. Upon disposition of all OUs, a final comprehensive ROD for the watershed will be pursued. The response action for this OU will not adversely impact the response actions of other OUs at SRS.

The RCRA permit will be revised to reflect selection of the final remedy using the procedures under 40 Code of Federal Regulations Part 270, and South Carolina Hazardous Waste Management Regulations R.61-79.264.101; 270.

Statutory Determinations

Based on the unit Remedial Investigation/Focused Feasibility Study/Risk Assessment (RI/FFS/RA) the TAOU poses a threat to human health (WSRC 2005a). Therefore, Alternative 2 (Dispose Staged Wastes Onsite, Cap Residual Contamination, Place Soil Amendments in Outfall Delta and Inner Swamp, and Implement Institutional Controls) has been selected as the remedy for the TAOU. The future land use of the TAOU is assumed to be industrial (in the industrial area) and industrial buffer (in the lowland area to the southwest).

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment. Five year reviews are required under CERCLA Section 121c.

As presented in the unit RI/FFS/RA report, the TNXOD OU Swamp High Ground and Outer Swamp subunits, Tile Field #1, Tile Field #3, and the TNX Area Process Sewer Lines do not pose a threat to human health and the environment. This is based on the following land uses: trespasser (TNXOD OU Swamp High Ground and Outer Swamp), residential (Tile Fields #1 and #3), and industrial (TNX Area Process Sewer Lines). Therefore, these units do not present a problem warranting remedial action. As presented in the RSER/EE/CA for the X-001 Outfall Drainage Ditch OU (WSRC 2004b) and the RSER/EE/CA for Tile Field #2 (WSRC 2004c), the residual soils remaining at these units after the excavation is completed do not pose a threat to human health and the environment. This assumes industrial land use at the X-001 Outfall Drainage Ditch OU and residential land use at Tile Field #2. Therefore, no further action is warranted. Tile Field #1, Tile Field #3, and the TNX Area Process Sewer Line are proximal to the proposed cap and NTSB (Figure 3), so they will be managed under the same institutional controls as established under the selected remedy in this ROD. The TNXOD OU Swamp High Ground and Outer Swamp subunits are within the T Area industrial buffer zone, so

access to and use of these areas will be controlled by existing site procedures and programs.

The selected remedy for the TAOU is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. At the TNXOD OU Inner Swamp and Outfall Delta, the use of soil amendments satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduce the toxicity, mobility, or volume of materials comprising principal threats through treatment).

In the long term, if the property is ever transferred to nonfederal ownership, the US Government will take those actions necessary pursuant to Section 120(h) of CERCLA. Those actions will include a deed notification disclosing former waste management and disposal activities as well as remedial actions taken on the site. The contract for sale and the deed will contain the notification required by CERCLA Section 120(h). The deed notification shall, in perpetuity, notify any potential purchaser that the property has been used for the management and disposal of waste. These requirements are also consistent with the intent of the RCRA deed notification requirements at final closure of a RCRA facility if contamination will remain at the unit.

The deed shall also include deed restrictions precluding residential use of the property. However, the need for these deed restrictions may be reevaluated at the time of transfer in the event that exposure assumptions differ and/or the residual contamination no longer poses an unacceptable risk under residential use. Any reevaluation of the need for the deed restrictions will be done through an amended ROD with USEPA and SCDHEC review and approval.

In addition, if the site is ever transferred to nonfederal ownership, a survey plat of the OU will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency.

The selected remedy for the TAOU leaves hazardous substances in place that pose a potential future risk and will require land use restrictions until the concentration of hazardous substances in the soil and groundwater are at such levels to allow for unrestricted use and exposure. As agreed on March 30, 2000, among the USDOE, USEPA, and SCDHEC, SRS is implementing a Land Use Control and Assurance Plan (LUCAP) to ensure that the LUCs required by numerous remedial decisions at SRS are properly maintained and periodically verified. The unit-specific Land Use Control Implementation Plan (LUCIP) incorporated by reference into this ROD will provide details and specific measures required to implement and maintain the LUCs selected as part of this remedy. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs selected under this ROD. The LUCIP, developed as part of this action, will be submitted concurrently with the Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP), as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the LUCIP will be appended to the LUCAP and is considered incorporated by reference into the ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA. The approved LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The LUCIP will remain in effect unless and until modifications are approved as needed to be protective of human health and the environment. LUCIP modification will occur only through another CERCLA document.

Data Certification Checklist

This ROD provides the following information:

- Constituents of concern (COCs) for the TAOU and their respective concentrations (Section V).

- Baseline risk represented by the COCs (Section VII).

- Cleanup levels established for the COCs and the basis for the levels (Section VIII).

- Current and reasonably anticipated future land and groundwater use assumptions used in the Risk Assessment and ROD (Section VI).

- Potential land use that will be available at the site as a result of the selected remedy (Section XI).

- Estimated capital, operation and maintenance, and total present worth cost; discount rate; and the number of years over which the remedy cost estimates are projected (Section XI).

- Key decision factor(s) that led to selecting the remedy (i.e., describe how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria) (Section XI).

- How source materials constituting principal threats are addressed (Section XI).

11/17/05
Date

Jeffrey M. Allison
Manager
U. S. Department of Energy
Savannah River Operations Office

12/21/05
Date

Beverly H. Banister
Acting Director
Waste Management Division
U. S. Environmental Protection Agency - Region 4

12/22/05
Date

Robert W. King, Jr.
Deputy Commissioner
Environmental Quality Control
South Carolina Department of Health and Environmental Control

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
ac	acre
bls	below land surface
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CFR	Code of Federal Regulations
CM	contaminant migration
CMI/RAIP	Corrective Measures Implementation/Remedial Action Implementation Plan
COC	constituent of concern
CSM	conceptual site model
DG	Discharge Gully
DPFR	Decommissioning Project Final Report
Eco	Ecological
EE/CA	Engineering Evaluation/Cost Analysis
ESD	Explanation of Significant Difference
FFA	Federal Facility Agreement
ha	hectare
HH	Human Health
HSWA	Hazardous and Solid Waste Amendments
IOU	integrator operable unit
IPSL	Inactive Process Sewer Line
LDR	Land Disposal Restriction
LLC	Limited Liability Company
LUC	land use control
LUCAP	Land Use Control and Assurance Plan
LUCIP	Land Use Control Implementation Plan
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
mg/kg	milligrams/kilogram
NBN	no building number
NCP	National Oil and Hazardous Substances Contingency Plan
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPV	net present value
NTSB	New TNX Seepage Basin
O&M	operation and maintenance
OTSB	Old TNX Seepage Basin
OU	operable unit

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

PCB	polychlorinated biphenyl
PCE	tetrachloroethene
pCi/g	picoCuries per gram
PP	Proposed Plan
PRG	preliminary remediation goal
PTSM	principal threat source material
RA	Risk Assessment
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RG	remedial goal
RI	Remedial Investigation
RI/FFS/RA	Remedial Investigation/Focused Feasibility Study/Risk Assessment
RME	reasonable maximum exposure
ROD	Record of Decision
RSER	Removal Site Evaluation Report
SB	Statement of Basis
SCDHEC	South Carolina Department of Health and Environmental Control
SCHWMR	South Carolina Hazardous Waste Management Regulations
SDD	Site Deactivation and Decommissioning
SEA	Site Evaluation area
SRS	Savannah River Site
SSL	soil screening level
SVE	soil vapor extraction
SVOC	semivolatile organic compounds
TAL	Target Analyte List
TAOU	T Area Operable Unit
TBC	To Be Considered
TBG	TNX Burying Ground
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TNXOD OU	TNX Outfall Delta, Lower Discharge Gully, and Swamp Operable Unit
TSCA	Toxic Substances Control Act
UCL	Upper Confidence Limit
USC	United States Code
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WSRC	Westinghouse Savannah River Company LLC

(This page intentionally left blank)

I. SAVANNAH RIVER SITE AND OPERABLE UNIT NAME, LOCATION, AND DESCRIPTION

Unit Name, Location, and Brief Description

T Area Operable Unit

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number: OU-96

Savannah River Site

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Identification Number: SC1 890 008 989

Aiken, South Carolina

United States Department of Energy (USDOE)

Savannah River Site (SRS) occupies approximately 310 square miles of land adjacent to the Savannah River, principally in Aiken and Barnwell counties of South Carolina (Figure 1). SRS is located approximately 25 miles southeast of Augusta, Georgia, and 20 miles south of Aiken, South Carolina.

The USDOE owns SRS, which historically produced tritium, plutonium, and other special nuclear materials for national defense and the space program. Chemical and radioactive wastes are by-products of nuclear material production processes. Hazardous substances, as defined by the CERCLA, are currently present in the environment at SRS.

The Federal Facility Agreement (FFA) (FFA 1993) for SRS lists the T Area Operable Unit (OU) (TAOU) as a Resource Conservation and Recovery Act (RCRA)/CERCLA unit requiring further evaluation. The TAOU required further evaluation using the CERCLA Remedial Investigation (RI) process to determine the actual or potential impact to human health and the environment of releases of hazardous substances, pollutants or contaminants to the environment.

The SRS is implementing an area-by-area remediation strategy as a means of completing the environmental cleanup of SRS. The new strategy accelerates

overall completion of the SRS environmental cleanup program at a reduced cost over previous projections. This strategy also reduces risk to workers, the public, and the environment. T Area will be the first area at SRS to be addressed under an area-wide remedial strategy. As part of this strategy, the TAOU was defined to include:

1) all the OUs in T Area currently listed in FFA Appendix C,

2) all the Site Evaluation areas (SEAs) in T Area currently listed in Appendix G.2 of the FFA, and

3) all the T-Area building slabs and underlying soil as subunits of the TAOU (listed in Appendix A).

A list of the units and facilities included in the TAOU is provided in Appendix A. Section III of this Record of Decision (ROD) discusses the TAOU units and facilities. Under an accelerated cleanup plan, an approved ROD will be in place for all FFA units in the TAOU and remedial activities will be completed for all surface units by the end of 2006. This will allow USDOE to request deletion of the TAOU from the National Priorities List (NPL).

II. SITE AND OPERABLE UNIT COMPLIANCE HISTORY

SRS Operational and Compliance History

The primary mission of SRS has been to produce tritium, plutonium, and other special nuclear materials for our nation's defense programs. Production of nuclear materials for the defense program was discontinued in 1988. SRS has provided nuclear materials for the space program, as well as for medical, industrial, and research efforts up to the present. Chemical and radioactive wastes are byproducts of nuclear material production processes. These wastes have been treated, stored,

and in some cases, disposed at SRS. Past disposal practices have resulted in soil and groundwater contamination.

Hazardous waste materials handled at SRS are managed under the RCRA, a comprehensive law requiring responsible management of hazardous waste. Certain SRS activities require South Carolina Department of Health and Environmental Control (SCDHEC) operating or post-closure permits under RCRA. SRS received a RCRA hazardous waste permit from the SCDHEC, which was most recently renewed on September 30, 2003. Module VIII of the Hazardous and Solid Waste Amendments (HSWA) portion of the RCRA permit mandates corrective action requirements for non-regulated solid waste management units subject to RCRA 3004(u).

On December 21, 1989, SRS was included on the NPL. The inclusion created a need to integrate the established RCRA Facility Investigation (RFI) program with CERCLA requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA 42 United States Code (USC) Section 9620, USDOE has negotiated a FFA (FFA 1993) with United States Environmental Protection Agency (USEPA) and SCDHEC to coordinate remedial activities at SRS into one comprehensive strategy which fulfills these dual regulatory requirements. USDOE functions as the lead agency for remedial activities at SRS, with concurrence by the USEPA - Region 4 and the SCDHEC.

Operable Unit Operational and Compliance History

T Area is one of several industrial use areas at SRS (Figure 1). It can be broadly divided into the industrial portion of T Area and the TNX Swamp (Figure 2). The industrial portion of T Area covers approximately 5.7 ha (14 ac). The TNX Swamp lies to the southwest at the base of a 13.7 m (45 ft) topographic slope. The contaminated portions of the swamp include the Outfall Delta and parts of the

Inner Swamp; these cover approximately 2.8 ha (7 ac). The boundary between the industrial area and the swamp corresponds to the 100-year floodline (Figure 3).

The industrialized portion of T Area was used in the development and testing of processes, facilities, and equipment for various SRS programs. Until 1978, T Area included three main buildings constructed in 1950 (buildings 677-T, 678-T, and 679-T). After 1978, the area was expanded to over 30 buildings (Figure 2) consisting of office administrative buildings, process buildings for large-scale experimental demonstrations, laboratories for research and analytical purposes, pilot-scale facilities, bulk tank storage, industrial wastewater processing facilities, and warehouse storage for a wide range of chemicals and specialty equipment. To date, all of the facilities in T Area have been dismantled and removed with the following exceptions: the 678-5T pump test facility and ancillary structures, the 702-T telecommunications building, the 906-T air stripper, and a soil vapor extraction (SVE) system (Figure 4). Figure 3 presents the location of the T Area facilities. The TNX Swamp was not used in T Area industrial processes; however, it is used routinely to manage surface runoff and stormwater.

The contamination requiring action at the TAOU is a result of T Area industrial processes, waste management practices, and an industrial accident during facility operations. Within the industrial area, the contamination is related to leaks from industrial processes and from disposal facilities such as tile fields, burying grounds, and seepage basins (Figure 5). In the TNX Swamp, the contamination resulted from a release of process water and entrained sediment from the Old TNX Seepage Basin (OTSB) down the topographic slope and into the swamp. The Outfall Delta was formed by these releases. The existing OUs and facilities remaining following dismantling activities in T Area are shown in Figure 6.

T Area Operable Unit

The TAOU is an area-based operable unit that incorporates most of the T Area footprint and the TNX Swamp (Figure 3). As such, it includes all of the applicable OUs, SEAs, and dismantled facilities as listed in Appendix A. Prior to the implementation of an area-based remedial strategy, remedial and removal actions for some of the waste units now identified under the TAOU were included in previous RCRA/CERCLA documentation (see Table 1). Remedial decisions for the T Area waste units and facilities addressed by this ROD do not affect the remedial actions of other TAOU subunits previously addressed.

The following subunits are designated as part of the TAOU:

TNX Area OU: The TNX Area OU is comprised of the New TNX Seepage Basin (NTSB) and ancillary process sewer line, Inactive Process Sewer Lines (IPSLs) associated with the discharge from Buildings 677-T and 678-T, TNX Burying Ground (TBG)/Vadose Zone, OTSB/IPSL/Discharge Gully (DG), and TNX Groundwater. Remedial decisions for these units are specified in the TNX Area OU ROD (WSRC 2003a).

TNXOD OU: The TNX Outfall Delta, Lower Discharge Gully, and Swamp (TNXOD OU) is comprised of the Lower Discharge Gully, Outfall Delta, Inner Swamp, Swamp High Ground, and Outer Swamp. A removal was addressed in a Removal Site Evaluation Report (RSER)/Engineering Evaluation/Cost Analysis (EE/CA) document (WSRC 2004a). This ROD addresses the remedial decisions for the TNXOD OU subunits.

X-001 Outfall Drainage Ditch: The removal action for the X-001 Outfall Drainage Ditch was addressed in a RSER/EE/CA document (WSRC 2004b). This ROD proposes a final action for the excavated soil.

TNX Burying Ground (Previously-Inaccessible Areas): A portion of the TBG was previously inaccessible for site characterization and remedial actions due to infrastructure interferences and facility operations. The balance of the TBG, the accessible areas and the vadose zone, are included in the TNX Area OU.

In addition, this subunit previously included the Neutralization Sump at Building 678-T (WSRC 2005a). A removal at the Neutralization Sump was performed as part of an Explanation of Significant Difference (ESD) to the TNX Area OU ROD (WSRC 2003a). The residual contamination is included in the TAOU as part of the Former Buildings and Slabs subunit (see below).

This ROD addresses the remedial decisions for the TBG (Previously-Inaccessible Areas).

Tile Fields: The T Area Tile Fields include Tile Field #1, Tile Field #2, and Tile Field #3. Tile Fields #1 and #3 were determined to require no remedial action because site materials do not present a problem warranting action for residential land use (WSRC 2005a). Pending the removal action at Tile Field #2 described in the RSER/EE/CA document (WSRC 2004c), no further action is warranted because the soil no longer presents a leachability threat. This ROD proposes a final action for the soil excavated from Tile Field #2 under the RSER/EE/CA.

TNX Area Process Sewer Lines: The TNX Area Process Sewer Lines (excluding the sections ancillary to the NTSB and OTSB) were investigated under the Site Evaluation Program and determined to require no remedial action based on industrial land use (WSRC 2003a). The sewers that were associated with discharges to the OTSB from Buildings 677-T and 678-T and the sewer at the NTSB (Figure 6) required remedial action; the final action is provided by the TNX Area OU ROD (WSRC 2003a).

Former Buildings and Slabs: Most facilities in T Area have been dismantled, leaving building slabs and sumps in place. Removal actions at the building slabs

and select underlying soils were addressed in Decommissioning Project Final Reports (DPFRs) (WSRC 2005b through 2005y) and summarized in the TAOU Remedial Investigation/Focused Feasibility Study/Risk Assessment (RI/FFS/RA) (WSRC 2005a). As a result, most slabs do not warrant further action based on industrial land use. This ROD addresses any uncertainty remaining for the slabs and underlying soil, including residual contamination remaining after removal actions at the Neutralization Sump 678-T and other sumps at Buildings 677-T and 678-T.

SEAs: Several SEAs (mostly spills) are included in the TAOU. They were excavated and determined to require No Action under that program. The evaluation assumed residential land use. This ROD documents the No Action decision.

A more detailed discussion of the operational and compliance history for the T Area waste units and facilities addressed by the TAOU ROD are provided below.

TNX Area OU

The TNX Area OU is comprised of the NTSB/IPSL, TBG/Vadose Zone, OTSB/IPSL/DG, and TNX Groundwater (Table 1). It is a RCRA/CERCLA OU (CERCLIS number 21). The TNX Groundwater includes all groundwater from T Area to the Savannah River. Groundwater is being managed under the TNX Area OU. The remedial action for the TNX Area OU is defined in the TNX Area OU ROD (WSRC 2003a).

TNXOD OU

The TNXOD OU is a RCRA/CERCLA OU (CERCLIS number 80). It consists of five subunits: (1) Lower Discharge Gully, (2) Outfall Delta, (3) Inner Swamp, (4) Swamp High Ground, and (5) Outer Swamp.

The TNXOD OU area was impacted by periodic overflows from the OTSB during the operational history of the basin. In addition, during closure of the OTSB in 1981, the basin was drained and remaining water and some accumulated sediments were released down a DG into the swamp west of TNX (Figure 5). The release created an alluvial fan, or "delta", of sediment (the Outfall Delta). The area most impacted by releases from the OTSB includes the delta and adjacent swamp.

Based on the findings of a unit investigation and assessment in the RFI/RI/Baseline Risk Assessment (BRA) (WSRC 2002a), the Lower Discharge Gully, Outfall Delta, and Inner Swamp require remedial action to address contaminated sediment and soil that pose exposure and leachability risks. To optimize resources, the remediation of the Lower Discharge Gully will be conducted with that of the OTSB/IPSL and Upper Discharge Gully of the TNX Area OU as specified in the approved ROD for the TNX Area OU (WSRC 2003a). The removal action for the Outfall Delta and Inner Swamp is addressed in a RSER/EE/CA (WSRC 2004a) (Table 1). Because contaminated soil excavated from the area was stockpiled in T Area, the soil is an issue that must be addressed by the selected remedial alternative for the TAOU. As a final action, this ROD proposes placing the stockpiled soil beneath the T Area cap. In addition, the remedial alternative selected in this ROD addresses uncertainties with residual contamination in the Outfall Delta and Inner Swamp.

No constituents warranting remedial action are present at the Swamp High Ground or Outer Swamp. Thus, no remedial action is proposed for these areas.

X-001 Outfall Drainage Ditch OU

The X-001 Outfall Drainage Ditch OU is a RCRA/CERCLA OU (CERCLIS number 96). The X-001 Outfall Drainage Ditch received liquid effluent from the cross-flow filter pit sump in Building 677-T (Figure 5). Radiological

contamination was found in the soil at the X-001 Outfall discharge area in 1995. A spill removal action was performed to excavate an area of approximately 3x6 m (10x20 ft) to a depth of 0.6 m (2 ft). Radiological surveys conducted during the removal action indicated that contamination was still present at a depth of 0.6 m (2 ft) below land surface (bls). Due to time and resource limitations, the mid-1990s removal action was discontinued and the excavation was backfilled. In 2003, pre-characterization sampling was performed.

The removal action for the X-001 Outfall Drainage Ditch OU was addressed in a RSER/EE/CA document (WSRC 2004b) (Table 1). No further action is planned for the X-001 Outfall Drainage Ditch OU because the residual soils no longer present a problem warranting action. However, because contaminated soil excavated from the area was stockpiled in T Area, the soil is an issue that must be addressed by the selected remedial alternative for the TAOU. As a final action, this ROD proposes placing the stockpiled soil beneath the T Area cap.

TNX Burying Ground (Previously-Inaccessible Areas)

The TBG (643-5G) was included as part of the TNX Area OU (CERCLIS number 21). At the time of TNX Area OU characterization, T Area was in the early stages of dismantlement and removal, and there were multiple interferences and ongoing facility activities that prevented characterization of some suspected waste buried in the TBG. In 2003 through 2004, SRS collected data in the areas of the TBG that were previously inaccessible. The characterization effort included sampling of an extensive area, including the Neutralization Sump at Building 678-T. A removal at the Neutralization Sump was conducted under an ESD to the TNX Area OU ROD. Previous removal and remedial actions were performed for the TBG during (1) a 1982-1984 action when most of the contaminated debris was removed from the TBG and (2) a 1996 action when previously unknown drummed waste was discovered. As a final action, this ROD proposes placing the T Area cap over the residual contamination.

Tile Fields

The TNX Area Process Sewer Lines and Tile Fields as Abandoned, No Building Number (NBN), is an OU in FFA Appendix C (CERCLIS number 96). Prior to 1986, sanitary wastewater generated within T Area was treated through one of three septic tank/tile field systems (Figure 5). The tile fields were constructed by excavating an area, placing a bed of gravel under and around tiles for drainage of sanitary wastewater, and backfilling with a sandy soil mixture. The tile fields and sanitary sewer lines were closed in 2002 under the 670-40T TNX Sanitary Wastewater Treatment Plant Closure Plan.

Tile Fields #1 and #3 were determined to require no remedial action because the pipes are located more than 0.3 m (1 ft) below ground surface, so human health and ecological risk pathways are broken (WSRC 2005a) (Table 1). The removal action for Tile Field #2 was addressed in a RSER/EE/CA document (WSRC 2004c). No further remedial action is warranted for Tile Field #2. However, because contaminated soil excavated from Tile Field #2 was stockpiled in T Area, the soil is an issue that must be addressed by the selected remedial alternative for the TAOU. As a final action, this ROD proposes placing the stockpiled soil beneath the T Area cap.

TNX Area Process Sewer Lines

The TNX Area Process Sewer Lines and Tile Fields as Abandoned, NBN, is an OU in FFA Appendix C (CERCLIS number 96). The TNX Area Process Sewer Lines consist of a network of approximately 1,829 m (6,000 ft) of gravity-fed underground process sewer lines buried up to 2.7 m (9 ft) bls. The various processes and laboratory work performed in T Area generated wastewater that was conveyed from the buildings via underground process sewer lines. The wastewater may have contained various chemicals including inorganic salts, low-level radionuclides, and organic solvents. Prior to 1988 (Figure 5), the

wastewater was discharged into two unlined, earthen basins (the OTSB and NTSB). After 1988, the wastewater was sent to the 904-T Effluent Treatment Plant. Operations in T Area have been shut down and no wastewater remains in the lines. Some portions of the process sewer lines are ancillary to other waste units and were evaluated with those waste units. This included the process sewer lines leading from Buildings 677-T and 678-T to the OTSB and the process sewer line at the NTSB. These portions of the process sewer lines (Figure 6) are managed under the ROD for the TNX Area OU (WSRC 2003a).The remaining portions of the process sewer lines were characterized under the SRS Site Evaluation Program and evaluated in the TAOU RI/FFS/RA (WSRC 2005a). These evaluations found that the sewers do not pose a risk to human health or the environment and determined that no remedial action is required.

Former Buildings and Slabs

Most facilities in T Area have been dismantled and removed. Building slabs remain, but slabs with identified contamination have been scabbled, as necessary, such that residual contamination is below $1x10^{-3}$ industrial risk levels (Table 1). This includes the sumps at Buildings 677-T and 678-T (and the Neutralization Sump 678-T), where sump materials and soils exceeding $1x10^{-3}$ industrial risk levels were excavated as part of the TNX Area OU removal actions described in the ESD for the TNX Area OU ROD (WSRC 2003a). The excavated areas are mapped in Figure 6. Process sewer lines have been plugged and exterior sumps have been backfilled with dirt and gravel. Due to the short time frame between demolition activities and implementation of the selected remedial alternative (approximately 2 years), no impact to soil and groundwater from residual contamination on building slabs is expected. Any additional uncertainty remaining at the unit will be addressed by including the slabs within the footprint of the T Area cap proposed in this ROD.

SEAs

Several sites in T Area have been investigated under the Site Evaluation program and determined to require No Action (see Appendix A). Many of these were spills which were further evaluated as part of the buildings and slabs evaluation. Two SEAs not related to spills were evaluated under the Site Evaluation Program and determined to require No Further Action. The Neutralization Sump 678-T and the TNX Area Process Sewer Lines were transferred from FFA Appendix G.1 to Appendix C; they are described above. The No Further Action designation indicates that the areas pose negligible risk to human health or the environment.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Both RCRA and CERCLA require the public to be given an opportunity to review and comment on the draft permit modification and proposed remedial alternative. Public participation requirements are listed in South Carolina Hazardous Waste Management Regulation (SCHWMR) R.61-79.124 and Sections 113 and 117 of CERCLA (42 USC Sections 9613 and 9617). These requirements include establishment of an Administrative Record File that documents the investigation and selection of the remedial alternative for addressing the TAOU surface and subsurface soils, excavated contaminated soil that has been stockpiled in the industrial portion of T Area, and contaminated concrete slabs. The Administrative Record File must be established at or near the facility at issue.

The SRS Public Involvement Plan (USDOE 1994) is designed to facilitate public involvement in the decision-making process for permitting, closure, and the selection of remedial alternatives. The SRS Public Involvement Plan addresses the requirements of RCRA, CERCLA, and the National Environmental Policy Act, 1969. SCHWMR R.61-79.124 and Section 117(a) of CERCLA, as amended, require the advertisement of the draft permit modification and notice of any proposed remedial action and provide the public an opportunity to participate in the selection of the remedial action. *The Statement of Basis/Proposed Plan for the*

T Area Operable Unit (WSRC 2005z), a part of the Administrative Record File, highlights key aspects of the investigation and identifies the preferred action for addressing the TAOU.

The FFA Administrative Record File, which contains the information pertaining to the selection of the response action, is available at the following locations:

US Department of Energy
Public Reading Room
Gregg-Graniteville Library
University of South Carolina – Aiken
171 University Parkway
Aiken, South Carolina 29801
(803) 641-3465

Thomas Cooper Library
Government Documents Department
University of South Carolina
Columbia, South Carolina 29208
(803) 777-4866

The RCRA Administrative Record File for SCDHEC is available for review by the public at the following locations:

The South Carolina Department of
Health and Environmental Control
Bureau of Land and Waste
Management
8911 Farrow Road
Columbia, South Carolina 29203
(803) 896-4000

Edisto Savannah District
Environmental Quality Control Office
206 Beaufort Street, Northeast
Aiken, South Carolina 29801
(803) 641-7670

The public was notified of the public comment period through mailings of the *SRS Environmental Bulletin*, a newsletter sent to citizens in South Carolina and Georgia, and through notices in the *Aiken Standard*, the *Allendale Citizen Leader*, the *Augusta Chronicle*, the *Barnwell People-Sentinel*, and *The State* newspaper. The public comment period was also announced on local radio stations.

The Statement of Basis (SB)/Proposed Plan (PP) 45-day public comment period began on May 12, 2005 and ended on June 26, 2005. A Responsiveness Summary, prepared to address any comments received during the public comment period, is provided in Appendix B of the ROD.

IV. SCOPE AND ROLE OF THE OPERABLE UNIT

Due to the complexity of multiple contaminant areas, the SRS is divided into integrator operable units (IOUs) for the purpose of managing a comprehensive cleanup strategy. Waste units within an IOU are evaluated and remediated individually.

The TAOU is located within the Savannah River IOU. Upon disposition of all OUs within the Savannah River Floodplain and Swamp IOU, a final comprehensive ROD for the IOU will be pursued with additional public involvement.

This ROD identifies the selected remedial alternative for those portions of the TAOU warranting action that are not addressed under the TNX Area OU ROD, RSER/EE/CAs, or DPFRs. Buildings 679-4T and 678-7T are not included in this ROD. These buildings have been dismantled and the remnants are under the footprint of Building 678-5T. This places them within an active use area and any further study will be conducted after the area is no longer active.

The overall strategy for addressing those units not previously addressed under other remedial or removal actions consists of multiple steps. They are (1) characterize each waste unit, delineating the nature and extent of contamination and identifying the media of concern (perform the RI); (2) to evaluate media of concern and exposure pathways and to characterize potential risks and identify constituents of concern (COCs); (3) identify and assess remedial alternatives; and (4) identify and perform a final action to remediate, as needed, the identified media of concern.

As shown in Table 1, several of the units are being addressed by remedial or removal actions that are underway or completed. Units with remedial or removal actions taken under other documents include:

- The TNX Area OU ROD (WSRC 2003a) defines the remedial actions for contaminated media of the NTSB/IPSL (surface water and soil), TBG/Vadose Zone (soil), OTSB/IPSL/DG (soil), and TNX Groundwater.

- The Explanation of Significant Difference (ESD) to the TNX Area OU ROD (WSRC 2005aa) defines the remedial action for soil and sump materials from 677-T/678-T suspect sumps.

- The RSER/EE/CA for the TNXOD OU (WSRC 2004a) documents that there are no COCs in the Swamp High Ground and Outer Swamp subunits. As a result, no action is warranted for these subunits.

- The RSER/EE/CA for the X-001 Outfall Drainage Ditch OU (WSRC 2004b) documents that the removal action meets the Remedial Action Objectives (RAOs) for the unit. As a result, no further action is warranted for this unit.

- The TAOU RI/FFS/RA (WSRC 2005a) documents that there are no COCs at Tile Field #1 and Tile Field #3. As a result, no action is warranted for these portions of the TAOU.

- The RSER/EE/CA for Tile Field #2 (WSRC 2004c) documents that the removal action meets the RAOs for the unit. As a result, no further action is warranted for this unit.

- The TAOU RI/FFS/RA (WSRC 2005a) documents that there are no COCs at the TNX Area Process Sewer Lines. As a result, no action is warranted for the sewer lines.

Units or materials to be addressed under this ROD include (Table 2):

- Soils excavated under removal actions from the Outfall Delta and Inner Swamp, the X-001 Outfall Drainage Ditch OU, and Tile Field #2 that were stockpiled in the industrial portion of T Area.

- Residual soil contamination in the Outfall Delta and Inner Swamp.

- Residual soil contamination in the TBG.

- Residual concrete contamination at remaining building slabs.

- Uncertainties with potential and residual under-slab soil contamination.

No further action under this ROD is required for the SEAs.

The response action identified in this ROD will not affect the remedial actions of other OUs at SRS.

V. OPERABLE UNIT CHARACTERISTICS

This section presents the Conceptual Site Model (CSM) for the TAOU, provides an overview of the characterization activities conducted for the OU, and summarizes the characterization results, leachability analysis, and COCs. The TAOU is an area-based operable unit which includes a number of OUs, SEAs, and dismantled facilities in T Area. As shown in Table 1, several of the units are being addressed by remedial or removal actions that are underway or completed. Units for which final actions have already been identified are not included in the following discussion. Details of the RCRA/CERCLA units (including those that have had actions identified) and the evaluation of the former buildings and slabs in T Area are presented in the RI/FFS/RA (WSRC 2005a).

Conceptual Site Model for the TAOU

The CSM for the TAOU is presented in two figures, (1) an overview CSM which describes the known and suspected sources of contamination, process-related release mechanisms, and primary waste management units (Figure 5) and (2) a detailed CSM which presents the waste units, COCs, and remedial actions that have been implemented (Figure 7). The known and potential human and ecological receptors and risk levels are presented in the summary of operable unit risks in Section VII. Please note that groundwater is being managed under the TNX Area OU; the groundwater corrective action will continue as specified in the TNX Area OU ROD (2003a).

Primary Sources of Contamination

As discussed in the RI/FFS/RA (WSRC 2005a) and shown on Figure 7, suspected primary sources of contamination included past T Area industrial process wastewater discharges and debris from an industrial accident. The majority of the primary source term was process wastewater from operations. However, because operations were shut down by 1988, there is no wastewater primary source material remaining. Debris from the industrial accident was buried in four known trenches. Between 1982 and 1984, most of the buried material was excavated. Because of numerous underground obstructions, as well as above-ground structures, an estimated 27 kg (59 lb) of uranyl nitrate remains buried.

Primary Source Mechanisms

Hazardous and/or radioactive wastes could be released from the primary sources of contamination by the following mechanisms:

- Leaching of contaminants from the buried waste in the TBG.

Secondary Sources of Contamination

Soil, sediment, and surface water are considered secondary source material if they contain contaminated media. These secondary sources include units contaminated by past operations in the industrial portion of T Area. Secondary sources of contamination include:

- Soil remaining at the TBG (Previously-Inaccessible Areas),
- TNX Area Process Sewer Lines and soil beneath,
- Soil and concrete at the Former Buildings and Slabs, including the Neutralization Sump 678-T,
- Soil and sediment at the TNXOD Inner Swamp and Outfall Delta, and
- Soil stockpiled in the industrial portion of T Area from the Outfall Delta, Inner Swamp, X-001 Outfall Drainage Ditch OU, and Tile Field #2.

Secondary Sources Mechanisms

Environmental media serves as both a reservoir through chemical bonding and biotic uptake and as a secondary release mechanism for contaminants at the TAOU. The following secondary release mechanisms are discussed in the RI/FFS/RA (WSRC 2005a):

- Dust and/or volatile emissions from the surface soil at the TBG (Previously-Inaccessible Areas), Former Buildings and Slabs, X-001 Outfall Drainage Ditch OU, Outfall Delta, Inner Swamp, and soils stockpiled in the industrial portion of T Area,
- Direct exposure to surface soil at the TBG (Previously-Inaccessible Areas), Former Buildings and Slabs, X-001 Outfall Drainage Ditch OU,

Outfall Delta, Inner Swamp, and soils stockpiled in the industrial portion of T Area,

- Direct exposure to concrete at the Former Buildings and Slabs and the TBG (Previously-Inaccessible Areas),

- Leaching of contaminants from surface and subsurface soil at the TBG (Previously-Inaccessible Areas), Former Buildings and Slabs, X-001 Outfall Drainage Ditch OU, Outfall Delta, and Inner Swamp,

- Leaching of contaminants from only subsurface soil at the TNX Area Process Sewer Lines, and

- Leaching of contaminants from soil stockpiled in the industrial portion of T Area. The soil is from excavations at Tile Field #2, X-001 Outfall Drainage Ditch OU, and Outfall Delta/Inner Swamp. The stockpiled soils will be managed to prevent exposure to receptors and releases to the environment. Due to the short time frame between placement of the contaminated media and the installation of the cap (approximately 2 years), no impact to groundwater associated with the contaminated media is anticipated.

Media Assessment

The following sections briefly summarize the assessment of the TAOU subunits. As discussed above, only those units that contain potential media of concern for TAOU are included; units for which a remedial action has been defined are not considered. A full description of the media assessment at each unit is presented in the TAOU RI/FFS/RA (WSRC 2005a), the RFI/RI/BRA for the TNX Area OU (WSRC 1999), the ROD for the TNX Area OU (WSRC 2003a), and the RFI/RI/BRA for the TNXOD OU (WSRC 2002a).

TNX Area OU

The TNX Area OU consists of the OTSB/IPSL/DG, TBG/Vadose Zone, NTSB/IPSL, and TNX Groundwater. The TNX Area OU ROD (WSRC 2003a) addresses the contamination at all of these units, so no additional discussion is required herein.

TNXOD OU

The unit investigation consisted of three phases of soil, sediment, and surface water (WSRC 2002a) sampling. Phases I and II focused on the nature and extent of contamination across the area. Phase III consisted of soil sampling concentrated on the most contaminated unit soils, which are located in the distal part of the Outfall Delta and nearby sections of the Inner Swamp. Samples were collected from over 100 locations and at depths from surface to 3 m (10 ft) bls. They were analyzed for Target Analyte List (TAL) inorganics, Target Compound List (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyl (PCBs), Toxicity Characteristic Leaching Procedure (TCLP), gross alpha, nonvolatile beta, and additional radionuclide analyses.

Contaminant migration (CM) COCs, human health COCs (based on the trespasser scenario), and principal threat source material (PTSM) COCs (based on mobility) were identified for the Outfall Delta and Inner Swamp. No COCs were identified at the Swamp High Ground or Outer Swamp.

In TNXOD soils, radioisotopes in the thorium-232 decay-series are major risk contributors for human receptors. Of these, thorium-228 is the primary risk driver in the Outfall Delta and Inner Swamp. The highest activities of thorium-228 are in the Inner Swamp southwest and south of the Outfall Delta (Figure 8). The highest activities are in the surface soil, but subsurface soil results are also significantly elevated above background. Activities decrease gradually with increasing distance

from the Outfall Delta area. In addition, there is a marked decline in activities relative to depth.

Another distinct area of elevated activities is in subsurface soil in the lower central part of the Outfall Delta. The surface soil results in the Outfall Delta are generally similar to background levels, but subsurface results are up to one order of magnitude higher than background. The increase of contamination with depth is due to continued erosion and deposition of "clean" sediments on top of the ground surface.

Contaminant fate and transport calculations in the RFI/RI/BRA for the TNXOD OU indicated that uranium-233/234, uranium-235, and uranium-238 at the Outfall Delta and Inner Swamp may present a potential leachability threat to groundwater. These constituents were identified as CM COCs.

There is considerable uncertainty as to whether the CM COCs pose an actual leachability threat because leaching is disrupted by upwelling groundwater and there is no discernable groundwater plume. Given that (1) the observed contamination is present in only a limited number of the wells in the Swamp High Ground, (2) there is not a widespread and well-defined groundwater plume, and (3) sampling results suggest that groundwater at the TNXOD OU is upwelling, the actual leachability threat posed by the CM COCs in the Inner Swamp, if any, is likely to be much less than that predicted by the contaminant migration modeling. However, the potential that the uranium is unit-related is retained as an uncertainty in the analysis. Any leachability threat that may exist is being managed by excavating a portion of the source term under a RSER/EE/CA (WSRC 2004a).

Human health COCs were identified for the Outfall Delta and Inner Swamp subunits. The most likely future receptor of this flood-prone area would be a

recreational trespasser gaining access from the Savannah River. The risk assessment is summarized in Section VII.

To reduce contamination in unit soils, selected areas of elevated contamination are being removed under a RSER/EE/CA (WSRC 2004a). This action will remove the highest concentrations of thorium-228 (>35 pCi/g) and in situ daughter products in the 0 to 0.3 m (0 to 1 ft) depth interval. The planned soil removal and restoration to grade with backfill will result in a nearly 70% reduction in risk in the Outfall Delta and Inner Swamp. Residual contamination will remain in TNXOD OU soils.

There is no PTSM based on toxicity for the Outfall Delta and Inner Swamp. The CM COCs for the Outfall Delta and Inner Swamp (uranium-233/234, uranium-235, and uranium-238) meet the definition of PTSM based on mobility, but there is uncertainty with whether these pose an actual leachability risk. This uncertainty will be addressed by the actions in this ROD.

X-001 Outfall Drainage Ditch OU

The unit investigation for the X-001 Outfall Drainage Ditch OU consisted of surface and subsurface sampling along the ditch. Samples were collected from 20 locations and analyzed for TAL inorganics, TCL VOCs, SVOCs, pesticides/PCBs, TCLP, gross alpha and nonvolatile beta. Additional radionuclide analyses were conducted on a sample that exceeded 20 pCi/g gross alpha and 50 pCi/g nonvolatile beta. Results from the human health screening identified uranium-238 as a COC for the industrial worker (Figure 7). No ecological COCs or CM COCs were identified. One sample at the outfall discharge point also exceeded Toxic Substances Control Act (TSCA) concentrations for a high occupancy industrial area with a PCB-1260 concentration of 22 mg/kg. The volume of contaminated soil was estimated at 296.3 m^3 (400 yd^3).

The constituent fate and transport analysis for the X-001 Outfall Drainage Ditch OU identified no CM COCs. The calculations are included in the RI/FFS/RA for the TAOU (WSRC 2005a); they indicate that the X-001 Outfall Drainage Ditch OU does not pose a threat to groundwater.

Additional information about the risk evaluation for the X-001 Outfall Drainage Ditch OU is summarized in the RSER/EE/CA for the X-001 Outfall Drainage Ditch OU (WSRC 2004b).

A PTSM assessment was performed using the soil samples collected along the drainage ditch. No PTSM based on toxicity is present at the X-001 Outfall Drainage Ditch OU (WSRC 2005a). There are no CM COCs identified at the X-001 Outfall Drainage Ditch OU; therefore, there is no PTSM based on mobility.

Tile Fields

T Area contains three separate sanitary tile fields (Tile Field #1, Tile Field #2, and Tile Field #3). No action is warranted at Tile Fields #1 and #3 (WSRC 2005a). A removal action is being implemented for mercury contamination at Tile Field #2 under the unit RSER/EE/CA (WSRC 2004c). Because there is no action required at Tile Fields #1 and #3, and because the contaminated material at Tile Field #2 will be removed under a prior action, the materials remaining at the Tile Fields do not impact the activities to be conducted in this ROD and they are not discussed herein.

At Tile Field #2, the constituent fate and transport analysis for Tile Field #2 identified mercury as a CM COC (WSRC 2005a). Contaminated soil and sewer lines from Tile Field #2 that exceed the leachability level were excavated, staged in a pile in the industrial portion of T Area, and the excavation backfilled with clean soil (WSRC 2004c). The stockpiled material will be retained at T Area and dispositioned in accordance with the TAOU ROD.

TNX Burying Ground (Previously-Inaccessible Areas)

Soil samples of previously-inaccessible areas of the TBG were collected between October 21, 2003 and February 3, 2004 from borings TBGX-01 through TBGX-37. A minimum of three intervals were sampled at each location (0 to 0.3 m, 0.3 to 1.2 m, and 2.4 to 3.0 m [0 to 1 ft, 1 to 4 ft, and 8 to 10 ft] bls). The samples were analyzed for TAL inorganics, TCL SVOCs, TCL VOCs, TCL pesticides/PCBs, gross alpha, and nonvolatile beta. At locations where gross alpha or nonvolatile beta exceeded 20 pCi/g or 50 pCi/g, respectively, an additional eight samples were collected from the ground surface to a maximum depth of 11.6 m (38 ft) bls. These additional samples received analyses for inorganics, SVOCs, VOCs, pesticides/PCBs, radionuclides (alpha, beta, and gamma), and TCLP metals.

Assuming the contamination extends over 0.4 ha (1 ac) to a depth of 4.6 m (15 ft), a total of approximately 27 kg (59 lb) of uranyl nitrate remains buried in the TBG, the estimated waste volume in the unexcavated areas is 459 m^3 (600 yd^3), and the estimated volume of contaminated soil is 18,500 m^3 (24,200 yd^3). The highest levels of contamination are in the immediate vicinity of the 678-T Annex, particularly near the Neutralization Sump 678-T, at depths of 0.3 to 3.7 m (1 to 12 ft). The nature and extent of contamination are detailed in the RI/FFS/RA (WSRC 2005a).

PCE (tetrachloroethene) is present at levels exceeding site-specific 2X average background concentration at various points across the TBG; it is randomly distributed across the soil column. It exceeds soil screening levels (SSLs) in and adjacent to Neutralization Sump 678-T (borings TBGX-24 and 678TS). The levels generally decrease beyond the vicinity of Building 678-T.

Mercury exceeds site-specific 2X average background at Neutralization Sump 678-T and to the north and east of the TBG. The mercury and compounds

preliminary remediation goal (PRG) is not exceeded in any surface soils. The SSL is exceeded in many samples across the area and through the soil column, but because the SSL is below the 2X average background concentration, many of these exceedances likely are naturally-occurring and not unit-related.

Gross alpha, uranium-233/234, uranium-235, and uranium-238 are concentrated at the Neutralization Sump 678-T and adjacent to 672-T. Consistent with this, the PRG is exceeded for uranium-238 in surface soil at boring TBGX-26. The industrial PRG is not exceeded in any other surface soils.

Based on the contaminant fate and transport analysis for the TBG (WSRC 2005a), mercury, PCE, uranium-233/234, uranium-235, and uranium-238 are identified as CM COCs (Figure 7).

Uranium-238 is identified as the only human health COC for the TBG. The ecological risk evaluation identified no ecological COCs for the TBG.

No PTSM based on toxicity is present (WSRC 2005a). The CM COCs meet the definition of PTSM based on mobility because they are predicted to leach to groundwater in less than 10 years.

TNX Area Process Sewer Lines

TNX Area Process Sewer Lines as Abandoned was formerly a SEA in FFA Appendix G.1 (Areas to be Investigated) but has been transferred to FFA Appendix C (RCRA/CERCLA units).

Some portions of the process sewer lines are immediately adjacent to other waste units and were investigated with those waste units. This included the process sewer lines leading from Building 677-T and 678-T to the OTSB and the process sewer line at the NTSB. These portions of the process sewer lines (Figure 6) are

managed under the ROD for the TNX Area OU (WSRC 2003a), which provides a final remedial action for these areas.

The following provides an assessment of all other process sewer lines in T Area.

The TNX Area Process Sewer Lines consists of a network of approximately 1,829 m (6,000 ft) of underground process sewer lines. They are up to 2.7 m (9 ft) bls and were gravity-fed lines. Operations in T Area have been shut down and no wastewater remains in the lines.

Soil sampling was performed in 2003 under the Site Evaluation Program. A total of 44 soil borings were planned (TPS-01 through TPS-44). Five of these locations (TPS-14, TPS-15, TPS-34, TPS-36, and TPS-44) were not sampled due to subsurface interferences.

At each location, a sample was collected from a 0.6 m (2 ft) interval beginning 0.3 m (1 ft) below the base of the process sewer line. At location TPS-33, which was adjacent to the Cross-Flow Filter Pit outside 677-T, two soil samples were collected: one at 0.6 to 1.2 m (2 to 4 ft) bls for the location under the process sewer line, and one at 1.8 to 2.4 m (5.8 to 7.8 ft) bls at the base depth of the Pump Pit (WSRC 2005a).

The samples were analyzed for gross alpha, nonvolatile beta, gamma pulse height analysis, TAL inorganics, and TCL SVOCs, VOCs, and pesticides/PCBs.

Based on the sample results, no COCs are identified for the TNX Area Process Sewer Lines (Figure 7).

Site Evaluation Areas

Several sites within the TAOU were investigated under the Site Evaluation Program and are identified as SEAs on Figure 6. The majority of these were spills

from various buildings and their potential impact to the TAOU was assessed as part of the building and slab evaluation in the following section.

Two SEAs not related to spills from buildings (Sandblast Area CMT-001 and Sandblast Area CMT-002) were evaluated under the Site Evaluation Program and determined to require No Further Action. This designation indicates that the areas pose no human health or environmental risk; therefore, no additional action is indicated for these areas. Because there is no action required, these two SEAs do not impact the activities to be conducted in this ROD and they are not discussed herein.

The only other Site Evaluation unit associated with T Area is the TNX Rubble Pile. This unit lies outside of the footprint of the TAOU and is not included as part of this OU investigation. It is located approximately 0.8 km (0.5 mi) south of T Area. It was approved for No Further Action in 1994.

Former Buildings and Slabs

Most of the facilities in T Area have been dismantled and removed. The only exceptions are the 678-5T pump test facility and ancillary structures, the 702-T telecommunications building, the 906-T air stripper, and a SVE system. Process sewer lines have been plugged and exterior sumps have been backfilled with dirt and gravel. Building slabs remain, but slabs with identified contamination have been scabbled such that residual contamination is below $1x10^{-3}$ industrial risk levels. Information on sampling, analysis, and data quality under the Site Deactivation and Decommissioning (SDD) program is provided in the TAOU RI/FFS/RA (WSRC 2005a). Analytical data for these units are presented in DPFRs (WSRC 2005b through 2005y) and are summarized in Table 3.

To support the analysis of the Former Buildings and Slabs, a review of historical documents was conducted to determine building designation, operation, chemical

use and storage for all former buildings within the TAOU, as well as any associated discharges, unplanned spills or releases from these buildings that may have occurred as part of T-Area operations. This information is included in the RI/FFS/RA (WSRC 2005a). Based on this review, the buildings and slabs were assigned to one of four categories, as described below.

Category I

This category includes facilities that were closed and/or operated under other permits or alternate regulations as well as former facilities/slabs that have sufficient documentation to support determination of no further evaluation. Operational history for these facilities indicates a low probability of contamination. Category I includes spills, transformers, permitted discharges, RCRA-regulated storage facilities, and excess facilities. Excess facilities include the General Service Facilities used to support domestic services and various storage areas where there is no history of use of hazardous or radioactive materials and where potential contamination is unlikely. The majority of the pre-existing structures and slabs are this type.

Category II

This category includes the Excess Facilities (former structures and associated slabs) that are being assessed under the SDD program. Sampling and analysis activities for these facilities are included in the DPFRs. The TAOU RI/FFS/RA (WSRC 2005a) supports a remedial decision, such as scabbling to below remedial goals. There are 17 facilities that are included in this category; they are listed in the TAOU RI/FFS/RA (WSRC 2005a).

Category III

This category includes the Excess Facilities (former structures and associated slabs) that are recognized as contaminated. Sampling and analysis activities for

these facilities are included in the DPFRs. Three facilities have been included in this category: 672-T, 677-T, and 678-T.

Neutralization Sump 678-T was backfilled with approximately 1.0 m (3.5 ft) of soil and covered with 0.15 m (0.5 ft) of concrete when the 678-T Annex slab was placed on top of the area. Consequently, there are no exposure pathways for human or ecological receptors and no human health or ecological COCs are identified. Neutralization Sump 678-T backfill material was evaluated under the Site Evaluation program. In February 2004, six attempts were made to sample the concrete at the bottom of the sump. Each attempt was unsuccessful and it was determined that the base of the sump was covered with metal. A boring (678TS-01) was then advanced through the slab of the 678-T Annex to obtain a soil sample adjacent to the sump. Soil samples from this boring were collected at 1.5 to 2.4 m, 2.4 to 3.4 m, and 3.4 to 4.3 m (5 to 8 ft, 8 to 11 ft, and 11 to 14 ft) below slab surface.

There is uncertainty regarding the presence of PTSM associated with the building sumps. This uncertainty was managed by an ESD to the TNX Area OU ROD (WSRC 2005aa). The residual contamination (below PTSM levels) will be addressed under this ROD.

Category IV

This category includes Excess Facilities (former structures and associated slabs) that have remaining uncertainties/questions that require more detailed reporting and study prior to regulatory disposition. Two facilities (679-4T and 678-7T) are included in this category; both structures are in the active operational area and are not included in the TAOU.

Based on all of the available information, any residual contamination present on the Former Buildings and Slabs is below PTSM levels. The contaminated materials will be addressed under this ROD.

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Land Uses

The TAOU is located near the western edge of SRS, approximately 0.40 km (0.25 mi) east of the Savannah River (Figure 1). SRS is a secured government facility with no residents. General public access to SRS is prohibited by perimeter fences, guards, and security patrols. Access by SRS workers to areas within the TAOU is controlled by physical and/or administrative controls. Physical controls include fences and chain barriers. Administrative controls include SRS's Site Use and Site Clearance Programs which restrict disturbance of the units and prevent drinking water use of contaminated groundwater under the units.

As outlined in the *Savannah River Site Future Use Project Report* (USDOE 1996), the USDOE has taken steps to prohibit residential use of SRS, including land in the vicinity of the TAOU, through its plan for current and future use of the SRS. Therefore, future residential use of the area is not anticipated.

The USDOE, USEPA, and SCDHEC agree that industrial land use restrictions are appropriate for the TAOU. Industrial land use restrictions will include land use controls to ensure protection against unrestricted (residential) uses. Institutional controls would also minimize the likelihood that trespassers would enter the lowland area to the southwest of the industrial portion of T Area. The future land use of the TAOU is anticipated to be the same as the current land use: industrial in the industrial portion of T Area and industrial buffer in the lowland area to the southwest (TNX Swamp).

Groundwater Uses/Surface Water Uses

Groundwater is being managed under the approved ROD for the TNX Area OU (WSRC 2003a). As stated therein, groundwater is not currently being used for human consumption or any other purpose, and future residential use of groundwater or surface water is not anticipated. The groundwater corrective action will continue as described in the TNX Area OU ROD.

VII. SUMMARY OF OPERABLE UNIT RISKS

Baseline Risk Assessment

As a component of the RFI/RI process, a RA was performed to evaluate risks associated with the TAOU. The RA estimates what risks the site poses if no remedial action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The RA includes human health and ecological risk assessments, a PTSM evaluation, and contaminant fate and transport. This section of the ROD summarizes the results of the RA for the media being addressed under the TAOU. In support of the discussion, Table 4 lists the COCs and their exposure point concentrations, Table 5 provides toxicity data, and exposure pathways, and Table 6 provides the calculated risk levels for the COCs based on future land use. As a point of comparison, risk information based on the future resident scenario is also presented in the text.

TNXOD OU - Outfall Delta and Inner Swamp Subunits

Summary of Human Health Risk Assessment

Isotopes in the thorium-232 decay-series are major risk contributors for human receptors. For the Outfall Delta, human health risk calculations (based on reasonable maximum exposure [RME] concentrations) indicate that actinium-228,

lead-212, radium-228, and thorium-228 (including daughter products) would pose unacceptable risk to a future trespasser (Table 6). For the Inner Swamp, human health risk calculations (based on RME concentrations) performed for the RFI/RI/BRA for the TNXOD OU (WSRC 2002a) indicate that actinium-228, radium-228, and thorium-228 (including daughter products) would pose an unacceptable risk to a future trespasser (Table 6). Exposure routes for the Outfall Delta and Inner Swamp are presented on Table 5. The cumulative risk for the trespasser is 5.41×10^{-5} in the Outfall Delta and 2.19×10^{-5} in the Inner Swamp (Table 6). Risk to a future resident receptor (8.8×10^{-3} in the Outfall Delta and 6.6×10^{-5} in the Inner Swamp) would also be unacceptable due to conservative assumptions for that scenario. As a result, the area requires risk management evaluation.

Of the major risk contributors, thorium-228 and associated daughter products are the primary risk drivers in both the Outfall Delta and Inner Swamp; the RFI/RI/BRA for the TNXOD OU indicated that risks from thorium-228 with daughter products are up to 2.53×10^{-5} for both the delta and swamp. In addition, thorium-228 is the most widespread of the cited constituents, so managing thorium-228 will in turn manage the other risk contributors.

Subsequent to calculation of baseline risk, more sampling in areas of maximum contamination was conducted to better define the vertical and lateral extent of these potential "hotspots". The maximum observed activity of thorium-228 detected during this additional sampling was 141 pCi/g. If the additional results are included in calculating risk, the maximum risk to the future trespasser (from thorium-228 plus daughter products) would increase to 8×10^{-5}. This risk level was recognized by USEPA and SCDHEC to warrant remedial action.

To mitigate risk, these subunits (Outfall Delta and Inner Swamp) are being addressed, in part, by a removal action under a RSER/EE/CA (WSRC 2004a). The highest concentrations of thorium-228 (>35 pCi/g) and in situ daughter

products in the 0 to 0.3 m (0 to 1 ft) depth interval were excavated from the TNXOD OU and stockpiled in the industrialized portion of T Area. The excavated area was restored to grade with clean backfill. The excavation and restoration are fully defined in the RSER/EE/CA (WSRC 2004a). The stockpiled material will be dispositioned under the TAOU ROD. This constitutes a limited excavation in the Inner Swamp adjacent to and near the margin of the Outfall Delta.

Removing selected areas of contamination will result in a reduction of risk from $8x10^{-5}$ (equivalent to 141 pCi/g) to $2x10^{-5}$ (equivalent to 35 pCi/g). The residual human health risk (future trespasser scenario) for these areas will, therefore, be less than $2x10^{-5}$, which represents a nearly 70% reduction in risk in the combined area of the Outfall Delta and Inner Swamp.

The remedy will not achieve cleanup levels acceptable for residential use and will leave contamination in place, therefore land use restrictions are part of the remedy to prevent residential use and will be implemented with this ROD's institutional controls. Figures 8, 9, and 10 illustrate the extent of contamination at the TNXOD OU.

Summary of Ecological Risks

There are no ecological COCs.

Summary of Contaminant Fate and Transport Analysis

Contaminant fate and transport calculations in the RFI/RI/BRA (WSRC 2002a) indicated that uranium-233/234, uranium-235, and uranium-238 at the Outfall Delta and Inner Swamp may present a potential contaminant migration (leachability) threat to groundwater. These constituents were identified as CM COCs. Based on the modeling calculations and underlying assumptions, the CM COCs were predicted to currently exceed maximum contaminant levels

(MCLs) in groundwater. As such, these CM COCs also met the definition of PTSM based on mobility. It is important to note that the underlying assumptions for the fate and transport modeling are conservative, generally overestimating the potential threat to groundwater. This approach biases the analysis towards false positives in order to minimize the possibility of missing potential threats to groundwater. It also typically requires further refinement of COCs based on uncertainty analysis to limit remedial actions to those constituents posing the most likely leachability threat. Figures 9 and 10 illustrate the extent of the contaminant migration concern, as represented by uranium-238 which has the widest extent of contamination above contaminant migration standards.

There is considerable uncertainty as to whether the CM COCs pose an actual leachability threat because leaching is disrupted by upwelling groundwater and there is no discernable groundwater plume. In particular, given the proximity of the TNXOD OU to a regional groundwater discharge area (the Savannah River and floodplain), there is some uncertainty with whether the aquifer is being recharged by waters infiltrating through contaminated soil/sediment at TNXOD OU (as modeled to identify CM COCs) or whether the groundwater is upwelling and downward migration of contaminants into the aquifer is greatly attenuated. Oxygen isotope studies at the TNXOD OU are consistent with surface water being principally sourced from upwelling groundwater (see Appendix J of the Corrective Measures Study/Feasibility Study, WSRC 2003b). The CM COCs for the Inner Swamp have been detected in groundwater above MCLs; however, the detections were in isolated monitoring wells located in the Swamp High Ground that are downgradient and sidegradient of the areas in the Outfall Delta and Inner Swamp exhibiting the highest soil/sediment contaminant levels. Groundwater in monitoring wells immediately downgradient of the highest soil contamination does not exceed MCLs for the CM COCs. The observed groundwater concentrations and lower pH levels may have been affected by operational releases sourced near the TBG. Alternatively, the observed uranium activities in

groundwater may represent naturally-occurring uranium that has leached from the aquifer. This latter hypothesis is supported by the fact that the locations with elevated uranium in groundwater also exhibit low groundwater pH. Because low pH waters are present in swamp environments, it has not been possible to discern if the low pH conditions are naturally-occurring or due to past releases of nitric acid from T-Area facilities. Given that (1) the observed contamination is present in only a limited number of the wells in the Swamp High Ground, (2) there is not a widespread and well-defined groundwater plume, and (3) the oxygen isotope results suggest that groundwater at the TNXOD OU is upwelling, the actual leachability threat posed by the CM COCs in the Inner Swamp, if any, is likely to be much less than that predicted by the contaminant migration modeling (WSRC 2005a). However, the potential that the uranium is unit-related is retained as an uncertainty in the analysis.

This uncertainty is being addressed, in part, by the removal action prescribed by the unit RSER/EE/CA (WSRC 2004a). The highest concentrations (>35 pCi/g thorium-228) in the 0 to 0.3 m (0 to 1 ft) depth interval were excavated from the TNXOD OU and stockpiled in T Area pending disposition under the TAOU ROD. This constitutes a limited excavation in the Inner Swamp adjacent to and near the margin of the Outfall Delta. The excavation is fully defined in the RSER/EE/CA (WSRC 2004a). Soil amendments will be placed in the excavations before backfilling to reduce the mobility of the contaminants that may remain at depth. In addition, a low permeability cap will be placed over CM COCs in the OTSB/IPSL/DG immediately upgradient of the TNXOD OU per the TNX Area OU ROD (WSRC 2003a). Residual contamination will remain after the removal action in the unexcavated portions of the Outfall Delta and Inner Swamp. This contamination poses a leachability threat and will be addressed by the preferred remedial alternative in this ROD and continued groundwater monitoring.

X-001 Outfall Drainage Ditch OU

Summary of Human Health Risk Assessment

The only constituent identified as a human health COC is uranium-238 (future resident risk = $3.0x10^{-5}$; future industrial worker risk = $1.3x10^{-5}$). Exposure pathways are provided on Table 5. A PCB, Aroclor-1260, is above a health based standard established under TSCA. This OU was addressed by a removal action under a RSER/EE/CA (WSRC 2004b). The contamination was excavated from the X-001 Outfall Drainage Ditch OU and stockpiled in T Area. The stockpiled material will be dispositioned under this ROD. The excavation was backfilled to grade with clean material. No residual contamination greater than $1x10^{-6}$ risk to an industrial worker remains at the unit. This ROD proposes a final action for the X-001 Outfall Drainage Ditch by providing for the disposition of the excavated material which is stockpiled in the industrialized portion of T Area.

Summary of Ecological Risks

There are no ecological COCs.

Summary of Contaminant Fate and Transport Analysis

There are no CM COCs.

TNX Burying Ground (Previously-Inaccessible Areas)

Summary of Human Health Risk Assessment

The human health COC requiring remedial action is uranium-238 (future resident risk = $4.8x10^{-6}$; future industrial worker risk = $2x10^{-6}$) in soil. Exposure pathways are provided on Table 5. This ROD proposes a final action for the TBG (Previously-Inaccessible Areas). Figures 11 and 12 illustrate the extent of uranium-238 at the TBG.

Summary of Ecological Risks

There are no ecological COCs.

Summary of Contaminant Fate and Transport Analysis

CM COCs include mercury, PCE, uranium-233/234, uranium-235, and uranium-238. Because these constituents are predicted to be in groundwater in less than 10 years, the CM COCs have been defined as PTSM based on mobility. While these constituents have been detected in groundwater at concentrations above their MCLs, no groundwater plumes associated with the CM COCs can be discerned. These contaminant migration uncertainties will be addressed by the preferred remedial alternative selected in this ROD. Figures 11 and 12 illustrate the extent of uranium-238, which represents the greatest extent of contamination of the CM COCs.

Tile Field #2

Summary of Human Health Risk Assessment

There is no exposure pathway for the human receptor because operational releases into the tile fields occurred at depths greater than 0.3 m (1 ft) bls. Therefore, no human health COCs were identified at Tile Field #2.

Summary of Ecological Risks

There are no ecological COCs.

Summary of Contaminant Fate and Transport Analysis

Mercury was identified as a CM COC for Tile Field #2. This subunit has been addressed by a removal action under a RSER/EE/CA (WSRC 2004c). Contaminated soil was excavated from Tile Field #2, and the excavated area was

backfilled to grade with clean material. The excavated soils are stockpiled in the industrialized portion of T Area. This ROD provides for the disposition of the stockpiled material as a final action for Tile Field #2.

Please note that there were no COCs identified for Tile Field #1 and #3 based on residential land use.

TNX Area Process Sewer Lines

Summary of Human Health Risk Assessment

There are no human health COCs.

Summary of Ecological Risks

There are no ecological COCs.

Summary of Contaminant Fate and Transport Analysis

No CM COCs were identified. Process sewer lines were sampled at locations biased to areas of potential leakage, and no leaks were identified.

Former Buildings and Slabs

Summary of Human Health Risk Assessment

A review of available operational records and site spill reports conducted as part of the RI/FFS/RA (WSRC 2005a) indicates that there is low probability of contamination from units, storage areas, and discharges from buildings that were regulated under alternate programs.

SDD has addressed characterization and remediation of former structures and slabs. Based on the analytical data collected under the Facilities

Decommissioning Projects process and results from a conservative risk estimate, no residual contamination on the concrete slabs was identified as PTSM. However, the risk estimation for some of these facilities was greater than $1x10^{-6}$ (future industrial worker scenario). Constituents that exceed $1x10^{-6}$ are identified as COCs. Exposure pathways for former structures and slabs are provided on Table 5.

A formal risk evaluation based on a future resident scenario was not performed on any of the buildings and slabs. However, the residential risk for the maximum contamination found at Building 678-T was calculated to provide a comparative risk range for residual material following D&D activities. The risk to a future resident would range from former facilities where no COCs would be identified (673-T, 679-8T) to a maximum case at 678-T, where an approximate risk of $1.8x10^{-3}$ would be calculated.

Of the 13 facilities evaluated, nine had COCs that exceeded the $1x10^{-6}$ threshold (Table 6). Chromium was identified as the major risk driver for many of the nonradiological facilities that had a residual risk greater than $1x10^{-6}$ (i.e., Buildings 671-T [residual risk $=2x10^{-6}$]; 679-T [residual risk = $2.1x10^{-6}$]; 682-T [residual risk = $3.8x10^{-6}$]; 772-T [residual risk = $1.7x10^{-6}$]; 607-46-T [residual risk = $1.9x10^{-6}$]; 904-T [residual risk $=1.2x10^{-6}$]). Arsenic was the major risk driver for Building 672-T (residual risk = $2.9x10^{-6}$). Radiologically contaminated facilities, such as 677-T (residual risk = $5.7x10^{-5}$, with arsenic, uranium-235 and uranium-238 being the major risk drivers) and 678-T (residual risk = $9.8x10^{-4}$ with arsenic, chromium, radium-228, thorium-228, thorium-232, uranium-235 and uranium-238 being the major risk drivers) are also above the $1x10^{-6}$ threshold based on a future industrial worker scenario. The slabs for former building 672-1T, 673-T, 675-T, and 679-8T did not have any COCs identified.

There is some uncertainty concerning potential risk to human health and the environment from the remaining slabs as well as ancillary structures where there

is limited information available on the historical use of the structure. Additionally, two discrete areas of higher contamination have been identified based on soil sampling beneath the 678-T slab. This includes the Neutralization Sump 678-T. Uncertainty regarding the presence of PTSM in near-surface soil was addressed by evaluation and subsequent removal of soil and sump materials exceeding $1x10^{-3}$ risk from selected sumps at buildings 678-T and 677-T. The $1x10^{-3}$ risk level corresponds to the toxicity threshold for PTSM. The selected sumps are those that demonstrated elevated levels of contamination based on sampling or process knowledge. They included sumps #4 and #8 at building 677-T, the area west of 678-T slab, the Neutralization Sump 678-T, the 678-T stainless steel sump in the tank gallery, and the 678-T centrifuge sump. The removals were part of the remedial action at the OTSB, conducted under an ESD to the TNX Area OU ROD (WSRC 2005aa).

Based on the history of T Area, small isolated areas of non-PTSM contamination may be present in soils beneath and adjacent to concrete slabs throughout T Area. Uncertainties remain regarding the presence of residual contamination on slabs and in soil beneath the buildings. However, it is known that the current risk exceeds the acceptable risk for a future resident. The presence of any residual contamination and its impact to human health and the environment will be mitigated by the remedy selected in this ROD.

Summary of Ecological Risks

A review of available operational records and site spill reports conducted as part of the RI/FFS/RA (WSRC 2005a) indicates that there is low probability of contamination from units, storage areas, and discharges from buildings that were regulated under alternate programs. No ecological COCs were identified for the Excess Facilities (former building structures) under the SDD process. These facilities were located in the industrialized portion of T Area which does not have habitat suitable for ecological receptors.

After the selected remedy is implemented, ecological receptors could use this area. However, the selected remedy will mitigate potential ecological exposure; thus, there is no future concern with ecological receptors using the unit after remediation.

Summary of Contaminant Fate and Transport Analysis

There is a low degree of uncertainty associated with the risk from spills, discharges, and other regulated facilities managed and closed under alternate regulations and programs; therefore, additional consideration is not required. No CM COCs were identified for the Excess Facilities (former building slabs). However, there is little information available on the historical use of some ancillary structures and there is some uncertainty concerning the potential leachability risk from the remaining slabs. These contaminant migration uncertainties will be addressed by the preferred remedial alternative selected in this ROD.

Principal and Low-Level Threat Source Materials

PTSM based on toxicity and mobility is present in T Area. For subunits in the TNX Area OU, the PTSM based on toxicity and mobility is being addressed by the approved ROD (WSRC 2003a). There is an uncertainty regarding the presence of PTSM in association with the Neutralization Sump 678-T. This uncertainty was managed by removing the soil and sump materials exceeding PTSM criteria for toxicity under an ESD to the approved TNX Area OU ROD. There is no PTSM identified for the stockpiled soils in the industrial portion of T Area or TNX Area Process Sewer Lines. The PTSM based on mobility in the Outfall Delta and Inner Swamp subunits of the TNXOD OU has been addressed in part under the RSER/EE/CA (WSRC 2004a). The remaining PTSM based on mobility will be addressed by the preferred remedial alternative selected in this ROD.

Outfall Delta or Inner Swamp: There is no PTSM based on toxicity for the Outfall Delta and Inner Swamp. Uranium-233/234, uranium-235, and uranium-238 are identified as PTSM based on mobility because contaminant leaching is predicted to impact groundwater above MCLs in less than 10 years (Figure 6). However, there is a high degree of uncertainty associated with identifying these constituents as PTSM. The soils/sediments do not appear to pose an imminent threat to groundwater as evidenced by the absence of a discernable groundwater plume even though the contaminated soils have been present at the TNXOD OU for over two decades (WSRC 2002a).

TBG (Previously-Inaccessible Areas): There is no PTSM based on toxicity in the TBG (Previously-Inaccessible Areas). Mercury, PCE, uranium-233/234, uranium-235, and uranium-238 are identified as PTSM based on mobility because contaminant leaching is predicted to impact groundwater above MCLs in less than 10 years. While these constituents have been detected in groundwater above their MCLs, no groundwater plumes associated with the CM COCs can be defined.

Conclusion of TAOU Risks

The primary basis for remedial action under this ROD is to prevent hazardous substances from future migration to groundwater at concentrations predicted to exceed MCLs and to manage exposure uncertainties from material excavated under the RSER/EE/CAs. The action implemented by this ROD will address risks remaining after previously approved actions in T Area.

The previously approved removal and remedial actions will not mitigate all environmental risks and potential future releases of hazardous substances at the TAOU to allow for unrestricted use. The BRA for portions of T Area calculated risk for the future industrial worker or trespasser. Risks to the future resident would be higher because the resident scenario is based on more conservative exposure assumptions. The remedies previously chosen will not achieve cleanup

levels acceptable for future residential use; therefore, at a minimum, land use restrictions to prevent residential use will be necessary and implemented with this ROD's institutional controls.

As stated above, the TAOU ROD will address the remaining risks, which include:

- Exposure and possible contaminant migration risks from soil and sediment with residual uranium/thorium decay series radioisotope contamination in the TNXOD OU,

- Exposure and contaminant migration risks in the TBG from soils contaminated with mercury, PCE, and uranium/thorium decay series radioisotopes,

- Uncertainties associated with soils contaminated with uranium/thorium decay series radioisotopes that pose a potential contaminant migration threat from the TNX Area Process Sewer Lines,

- Soil contaminated with uranium/thorium decay series radioisotopes and stockpiled in the TAOU and present exposure or contaminant migration risks,

- Remaining building slabs that have metals or uranium/thorium decay series radioisotopes contamination on concrete slabs or in soils that may pose an exposure risk, and

- Uncertainty with potential under-slab soil contamination of metal or uranium/thorium decay series radioisotopes that may pose a future contaminant migration risk. This includes the residual soil contamination at Neutralization Sump 678-T.

It is the judgment of USDOE, USEPA, and SCDHEC that the preferred alternative identified in this ROD, or one of the other measures considered in the

SB/PP, is necessary to protect public health, welfare, or the environment from threatened releases of hazardous substances into the environment.

VIII. REMEDIAL ACTION OBJECTIVES AND REMEDIAL GOALS

Remedial action objectives (RAOs) are used as the framework for developing remedial alternatives and are formulated to achieve the overall goal of protecting human health and the environment. RAOs are based on the nature and extent of contamination, threatened resources, potential for human and environmental exposure, and the anticipated future land use. The RAOs for the TAOU are as follows:

- Ensure that the future land use in the industrial portion of T Area is restricted to industrial land use and the future land use of the TNX Swamp is restricted to industrial buffer zone land use.

- Prevent exposure to contaminants that exceed target risk levels for receptors in the industrial portion of T Area.

- Prevent exposure to residual contamination in the Outfall Delta and Inner Swamp.

- Prevent contaminants in the industrial portion of T Area, the Outfall Delta, and the Inner Swamp from leaching to groundwater and impacting groundwater above MCLs.

- Prevent exposure to ecological receptors.

Remedial goals (RGs) are target cleanup criteria. For subunits of the TAOU with COCs, RGs are provided in Table 7.

Contaminant Migration RGs: Contaminant migration COCs are identified for the Outfall Delta and Inner Swamp, the TBG (Previously-Inaccessible Areas), and

stockpiled soils from Tile Field #2. No CM COCs are identified for other units of the TAOU.

The remedial goals to mitigate the leachability threat from these COCs are expressed in the RAOs. For the industrial portion of the TAOU (including the TBG), the USDOE, SCDHEC, and USEPA have agreed that the likely remedial strategy to achieve the contaminant migration RAO will be to mitigate the leachability threat through containment. A leachability assessment was performed under the expected end state after remediation to demonstrate that the anticipated remedy will meet contaminant migration RAOs. This analysis is provided in Appendix O of the RI/FFS/RA (WSRC 2005a). The evaluation indicates that a typical low permeability cap utilizing geosynthetic material having an effective soil hydraulic conductivity of $\leq 1 \times 10^{-9}$ cm/sec will meet the RAO to prevent contaminants from leaching to groundwater and impacting groundwater above MCLs. Soils excavated under removal actions and stockpiled in the industrial portion of T Area would be placed in the cap footprint; therefore, the leachability threat posed by these soils would be managed by the cap.

For the Outfall Delta and Inner Swamp, the contaminant migration RGs established in the TNXOD OU RFI/RI/BRA (WSRC 2002a) are presented on Table 7. The most contaminated soils and sediments in the Outfall Delta and Inner Swamp (>35 pCi/g thorium-228) were excavated and the removal backfilled in accordance with the RSER/EE/CA for the TNXOD OU (WSRC 2004a). As part of the RSER/EE/CA, soil amendments were placed in the excavations before backfilling to reduce the mobility of contaminants that may remain at depth. After the removal action, the residual leachability threat in the unexcavated areas of the Outfall Delta/Inner Swamp will be mitigated by the preferred remedial alternative for the TAOU (i.e., soil amendments).

Human Health RGs: Human health COCs are identified for the Outfall Delta and Inner Swamp, the TBG (Previously-Inaccessible Areas), and stockpiled soils from X-001 Outfall Drainage Ditch OU.

For the TBG (Previously-Inaccessible areas), the only human health COC is uranium-238. The RG for this constituent is established as the uranium-238 PRG from the X-001 Outfall Drainage Ditch OU.

For the Outfall Delta and Inner Swamp, the remedial goal for the removal action was set in the RSER/EE/CA as 35 pCi/g for thorium-228. For the residual contamination that will remain after the removal action, human health RGs were calculated for the most likely future land use scenario (trespasser). Table 7 presents the RGs corresponding to risks of $1x10^{-6}$ for the trespasser exposure scenario. Localized areas within the top 0.3 m (1 ft) of the soil column may exceed these RGs; however, based on existing sampling data, the majority of the exceedances will be below 0.3 m (1 ft) bls after the removal action under the RSER/EE/CA. The unit will not pose an unacceptable risk because the RME does not exceed the RG (the RME is the lesser of the 95 percent upper confidence limit or the maximum concentration in all the samples).

For the Former Buildings and Slabs, available operational records and site spill reports indicate that there is a low probability of contamination from units, storage areas, and building discharges that were evaluated or regulated under alternate programs. SDD has addressed characterization and remediation of former structures and slabs. Based on the analytical data collected under the Facilities Decommissioning Projects process and results from a conservative risk estimate (WSRC 2005a), no residual contamination on the concrete slabs was identified as PTSM. However, residual risk for some of these facilities was greater than $1x10^{-6}$ based on the future industrial worker scenario and there is some uncertainty concerning potential risk to human health and the environment from remaining slabs and those ancillary support structures with limited historical

information. The preferred remedial alternative will prevent exposure of human health receptors to residual contaminants, mitigating the uncertainty.

Ecological RGs: Ecological RGs are based on risk to ecological receptors. There are no ecological COCs identified for the TAOU. However, the preferred remedial alternative will prevent exposure of ecological receptors to residual contaminants.

IX. DESCRIPTION OF ALTERNATIVES

Remedy Components, Common Elements, and Distinguishing Features of Each Alternative

Alternative 1: No Action:

Estimated Percent Value Cost = $0

Construction Time to Complete = 0 years to construct

The No Action alternative is required by 40 Code of Federal Regulations (CFR) 300.430(e)(6) of the National Oil and Hazardous Substances Contingency Plan (NCP) to serve as a baseline for comparison with other remedial alternatives. No Action would consist of no additional remedial activities. No Action excludes any further effort to monitor, remove, treat, or otherwise mitigate the potential spread of contamination. This response action takes no additional measures to reduce the potential for exposure to contaminants.

The groundwater corrective action would continue as specified in the TNX Area OU ROD (WSRC 2003a). At the OTSB/IPSL/DG, the PTSM would be excavated and disposed; the low permeability cap would be constructed and maintained and institutional controls would only be implemented as specified in the TNX Area OU ROD. Uncertainty regarding the presence of PTSM in near-surface soil would be managed by removing soil and sump materials exceeding $1x10^{-3}$ risk from

selected sumps at buildings 678-T and 677-T. The selected sumps are those that have demonstrated elevated levels of contamination; they include sumps #4 and #8 at building 677-T, the area west of 678-T slab, the 678-T Neutralization Sump, the 678-T stainless steel sump in the tank gallery, and the 678-T centrifuge sump. The removals will be part of the remedial action at the OTSB. The NTSB would also be drained, backfilled, and maintained as specified in the TNX Area OU ROD. The RSER/EE/CA removal actions would be performed and the excavated materials would remain stockpiled in the industrialized portion of T Area. This would include (1) the soil and sediment excavated from the Outfall Delta and Inner Swamp; (2) the soil excavated from the X-001 Outfall Drainage Ditch OU; and (3) the soil excavated from Tile Field #2. The TBG, the TNX Area Process Sewer Lines, and the building slabs would remain in their present configuration; no cap would be constructed over these areas. No soil amendments would be spread in the Outfall Delta/Inner Swamp. Existing administrative and engineering controls associated with SRS would remain for as long as the Government maintains control of SRS.

This remedy would take 0 years to construct, but protection would not be achieved. The costs for this alternative (as net present value [NPV]), including operation and maintenance (O&M) costs, are as follows:

Total Capital Cost:	$0
Total O&M Cost (NPV):	$0
Total Cost (NPV):	$0

Alternative 2: Dispose Staged Wastes Onsite, Cap Residual Contamination, Place Soil Amendments in Outfall Delta and Inner Swamp, and Implement Institutional Controls:

Estimated Percent Value Cost = $11.1 million (3.9% discount rate/100 years for O&M costs)

Construction Time to Complete = Less than 1 year to construct

After removal and offsite disposal of the PTSM from the OTSB/IPSL, as well as excavation of soil and sump materials exceeding $1x10^{-3}$ risk in sumps from buildings 677-T and 678-T (as specified in the TNX Area OU ROD), a low permeability cap would be constructed in the industrialized portion of T Area. The cap would be placed over residual contamination in the industrial portion of T Area that may pose a contaminant migration and/or exposure threat. In addition, soils excavated under RSER/EE/CA removal actions and stockpiled in the industrialized portion of T Area would be placed in the cap footprint area and maintained with a clean soil or rock cover until cap installation. The area would be institutionally controlled to prevent disturbance of the stockpiled soils prior to cap installation activities. Due to the short time frame between placement of the contaminated media and the installation of the cap (approximately 2 years), no impact to groundwater associated with the contaminated media is anticipated.

To manage the uncertainty associated with the risks from contaminants remaining at the unit, the cap would cover the following facilities (Figure 13):

1. All building slabs with a residual risk greater than $1x10^{-6}$ and soils adjacent and beneath the slabs. The sole exception is the 904-T slab. The residual risk for the 904-T slab is $1.2x10^{-6}$.

2. The TBG (Previously-Inaccessible Areas).

3. The slabs remaining at Buildings 677-T and 678-T, including sumps and excavated areas.

4. Most of the TNX Area Process Sewer Lines (note that lines that pose a potential threat and are not under the cap footprint are being excavated under a removal action at Tile Field #2).

5. Soil and sediment excavated under the Outfall Delta and Inner Swamp removal action and stockpiled in the industrial portion of T Area. The most contaminated soils and sediments in the Outfall Delta and Inner Swamp (>35 pCi/g thorium-228) in the 0 to 0.3 m (0 to 1 ft) depth interval were excavated in accordance with a RSER/EE/CA for the TNXOD OU (WSRC 2004a). Up to 2,293 m^3 (3,000 yd^3) of soil/sediment were excavated, primarily from the Inner Swamp adjacent to the downgradient margin of the Outfall Delta. The soil/sediment was transported to the industrialized portion of T Area and stockpiled for placement under the T-Area cap. The soil/sediment contains thorium-232 decay-series isotopes. Thorium-228 is the primary risk driver in both the Outfall Delta and Inner Swamp. It poses a maximum risk to the recreational trespasser of $8x10^{-5}$. Thorium-228 is co-located with the highest concentrations of the other COCs and is present at activities up to 141 pCi/g. The planned soil removal and restoration to grade with backfill will result in a nearly 70% reduction in risk in the Outfall Delta and Inner Swamp. This corresponds to a residual human health risk of approximately $2x10^{-5}$. Placement of excavated soil beneath the cap eliminates the human health exposure and leachability threat from the highest levels of contamination.

6. Soil excavated under the X-001 Outfall Drainage Ditch OU removal action. Approximately 296.3 m^3 (400 yd^3) of soil was excavated under a RSER/EE/CA (WSRC 2004b) and stockpiled in the industrialized portion of T Area. This soil contains uranium-238 that poses a risk of $1x10^{-5}$ to a future industrial worker and PCB-1260 above the 10 mg/kg PCB remediation level for industrial high-occupancy areas. This soil would be located under the T-Area cap, eliminating the human health exposure pathway.

7. Soil excavated under the Tile Field #2 removal action. Approximately 984 m^3 (1,287 yd^3) of soil were excavated under a RSER/EE/CA (WSRC 2004c) and stockpiled in the industrialized portion of T Area. This soil contains relatively

low concentrations of mercury that is considered a CM COC. The soil would be placed under the T-Area cap, eliminating the potential for leaching to groundwater.

8. Non-PTSM materials associated with the 677-T and 678-T slabs remaining in place after characterization of soils and related activities.

The cap would be integrated with the 0.5 ha (1.2 ac) low permeability cap for the OTSB/IPSL/DG that is specified in the TNX Area OU ROD (WSRC 2003a). The estimated additional area of the cap is 3.3 ha (8.2 ac) for a total area of 3.8 ha (9.4 ac) (Figure 13).

To construct the engineered cap, the surface of the unit would be prepared by removing trees and other vegetation. Vegetation would be cut down and left on-unit at the TAOU. Vegetation would not be placed under the cap because large amounts of biodegradable material under the cap could result in structural damage to geosynthetic materials through subsidence. The surface of the unit would be grubbed to remove tree stumps and the surface would be graded in preparation for the cap. Additional clean soil would be brought to the unit from an approved fill-material source (e.g., Three Rivers Landfill), pursuant to standard sampling and analytical protocols to confirm fill composition. Standard erosion control measures such as silt fences and hay bales would be used during construction to manage erosion. The cap would be constructed of a low permeability geosynthetic material that would provide sufficient infiltration control to mitigate CM COCs. Leachability calculations indicate that a typical low permeability cap utilizing geosynthetic material would sufficiently manage the leachability concern. The cap would contain a drainage layer above the low permeability layer, and would be topped with a vegetative cover that complies with Executive Order 13112, as appropriate, given design limitations (i.e., native vegetation) (see Figure 14). Certain structures, such as remediation and monitoring wells, would penetrate the cap at a few locations. Wells within the cap borders will be modified to extend

above the cap. The structures would be flashed and sealed to prevent leakage (see Figure 15) and would be constructed per R.61-71 of the South Carolina Well Standards. Although not shown, all wells penetrating the cap will be constructed with a standard well pad. Following construction, the cap will receive periodic inspections to identify maintenance and repair actions required to ensure its continued function. The requirements and schedule for cap maintenance and inspections will be included in a unit-specific Land Use Control Implementation Plan (LUCIP) (see Section IX for further discussion).

PTSM in the OTSB would be removed from T Area. Residual contamination would remain in the following locations:

1. At depth (assumed 1.2 to 8.2 m [4 to 27 ft] bls) in the OTSB; however, there are no human health or ecological exposure pathways, and the leachability threat will be negligible because the OTSB will be under the low permeability cap.

2. At depth greater than 1.2 m (4 ft) bls in the Upper and Lower Discharge Gully; however, the human health and ecological exposure pathways will be broken and the leachability threat will be negligible because the Upper and Lower Discharge Gully will be under the low permeability cap.

3. At depth (assumed 1.2 to 6.7 m [4 to 22 ft] bls) in the NTSB; however, the human health and ecological exposure pathways will be broken because the NTSB will be under backfill.

4. In groundwater greater than the MCL (until remedial actions to groundwater are complete). The 906-T Air Stripper will remain in operation to allow continued remediation of VOCs in groundwater.

5. At the surface and in the subsurface in the Outfall Delta and Inner Swamp. The highest levels of contamination would be removed under a RSER/EE/CA,

but residual contamination would remain in the surface and subsurface. As part of the RSER/EE/CA, the remaining soil/sediment will be treated with soil amendments placed on the floor of the open excavation. After soil removal and placement of the soil amendments, the excavated areas will be restored by backfilling with clean soil and the surface returned to original grade. After the soil removal, the residual leachability threat in the unexcavated areas will be mitigated by the application of soil amendments in the Outfall Delta and Inner Swamp (approximately 5.7 ac). Soil amendments will include apatite (a natural calcium-phosphate material) and may include zero-valent iron if needed. These amendments tend to fix the CM COCs, thereby attenuating leaching to groundwater. The degree of fixation of site contaminants by these treatment materials is described in *Reduction of Contaminant Mobility at the TNX Outfall Delta through the use of Apatite and Zero-Valent Iron as Soil Amendment* (WSRC 2002b). The current vegetation in the swamp would not need to be destroyed.

6. At depths up to 13.7 m (45 ft) bls in the TBG; however, the human health and ecological exposure pathways will be broken and the leachability threat will be negligible because the TBG will be under the low permeability cap. The SVE System will continue to operate.

7. At depth (1.2 to 4.9 m [4 to 16 ft] bls) near the Neutralization Sump 678-T; however, the sump and soil exceeding $1x10^{-3}$ risk, which is the toxicity threshold for PTSM, will be excavated as part of the remedial actions for the OTSB; this will be covered by an ESD to the TNX Area OU ROD. In addition, there are no human health or ecological exposure pathways, and the leachability threat will be negligible because this area will be under the low permeability cap.

8. In the industrialized portion of T Area (under the low permeability cap) where soils removed under RSER/EE/CAs are stockpiled. This would include the

soils and sediments from the Outfall Delta and Inner Swamp removal action, the soil from the X-001 Outfall Drainage Ditch OU removal action, and the soil from the Tile Field #2 removal action. In addition, any non-PTSM soils and materials generated as part of the 677-T and 678-T remedial action may be stockpiled in the industrial portion of T Area. The human health exposure pathway will be broken because the material will be under the low permeability cap.

9. On building slabs (under the low permeability cap). The highest levels of contamination were addressed under the SDD program, but residual contamination exceeding $1x10^{-6}$ risk (future industrial worker) may remain. The human health exposure pathway will be broken because the material will be under the low permeability cap.

Since contamination would be left at the unit, institutional controls would be maintained to prevent unrestricted land use. Institutional controls are administrative measures taken to minimize the potential for human exposure. Institutional controls would be used to prevent access by the public and control future land use. This would include continued use of SRS security guards, patrols, and fences at SRS. Institutional controls would also consist of administrative procedures to control activities by SRS workers, including prevention of unauthorized excavation or disturbance of the unit. Signs would be posted and maintained in the industrialized part of T Area to indicate that the contamination remains buried at depth. At the Outfall Delta and Inner Swamp, signs would be installed and maintained to prevent trespassers from inadvertently accessing these areas.

Groundwater would continue to be monitored and reported annually in the Comprehensive TNX Area Annual Groundwater and Effectiveness Monitoring Strategy Report. The groundwater corrective action would continue as specified in the TNX Area OU ROD.

This remedy would take less than 1 year to construct, and protection would be immediate. The costs for this alternative are as follows:

Total Capital Cost:	$8.0	million
Total O&M Cost (NPV):	$3.1	million
Total Cost (NPV):	$11.1	million

Alternative 3: Dispose Staged Wastes Offsite, Cap Residual Contamination, Place Soil Amendments in Outfall Delta and Inner Swamp, and Implement Institutional Controls:

Estimated Percent Value Cost = $14.3 million (3.9% discount rate/100 years for O&M costs)

Construction Time to Complete = Less than 1 year to construct

Alternative 3 would involve off-SRS disposal of the soil excavated under TNX Area OU ROD and RSER/EE/CAs that would be stockpiled in the industrialized portion of T Area. This would include the following:

1. Soil and sediment excavated under the Outfall Delta and Inner Swamp removal action. The most contaminated soils and sediments in the Outfall Delta and Inner Swamp (>35 pCi/g thorium-228) in the 0 to 0.3 m [0 to 1 ft] depth interval were excavated in accordance with a RSER/EE/CA for the TNXOD OU. Up to 2,293 m^3 (3,000 yd^3) of soil/sediment were excavated, primarily from the Inner Swamp adjacent to the downgradient margin of the Outfall Delta. The soil/sediment contains thorium-232 decay-series isotopes. Thorium-228 is the primary risk driver in both the Outfall Delta and Inner Swamp and poses a maximum risk for a recreational trespasser of $8x10^{-5}$. Thorium-228 is co-located with the highest concentration of the other COCs

and is present at activities up to 141 pCi/g. This soil and sediment would be shipped to an off-SRS disposal facility such as Envirocare.

2. Soil excavated under the X-001 Outfall Drainage Ditch OU removal action. Approximately 296.3 m^3 (400 yd^3) of soil was excavated under a RSER/EE/CA. This soil contains uranium-238 that poses a risk of $1x10^{-5}$ to a future industrial worker and PCB-1260 above the 10 mg/kg PCB remediation level for industrial high-occupancy areas. This soil would be shipped to an off-SRS disposal facility such as Envirocare.

3. Soil excavated under the Tile Field #2 removal action. Approximately 984 m^3 (1,287 yd^3) of soil were excavated under a RSER/EE/CA. This soil contains mercury at relatively low concentrations that is considered a CM COC. This soil would be shipped to an off-site disposal facility.

4. Non-PTSM materials associated with the 677-T and 678-T slabs remaining in place after characterization of soils and related activities.

After removal of these soils, plus excavation and offsite disposal of the PTSM from the OTSB/IPSL, and soil and sump materials exceeding $1x10^{-3}$ risk in sumps from buildings 677-T and 678-T (as specified in an ESD to the TNX Area OU ROD), a low permeability cap would be constructed in the industrialized portion of T Area. The cap would be placed over residual contamination in the industrial portion of T Area that may pose a contaminant migration and/or exposure threat.

To manage the uncertainty associated with the risks from contaminants remaining at the unit, the cap would cover the following facilities (Figure 13):

1. All building slabs with a residual risk greater than $1x10^{-6}$ and soils adjacent and beneath the slabs. The sole exception is the 904-T slab; the residual risk for this slab is at $1.2x10^{-6}$.

2. The TBG (Previously-Inaccessible Areas).

3. The sumps and excavated areas at Buildings 677-T and 678-T, including Neutralization Sump 678-T.

4. Most of the TNX Area Process Sewer Lines (note that lines that pose a potential threat and are not under the cap footprint were excavated under a removal action at Tile Field #2).

The cap would be integrated with the 0.5 ha (1.2 ac) low permeability cap for the OTSB/IPSL/DG that is specified in the TNX Area OU ROD. The estimated additional area of the cap is 3.3 ha (8.2 ac) for a total area of 3.8 ha (9.4 ac) (Figure 13).

To construct the engineered cap, the surface of the unit would be prepared by removing trees and other vegetation. Vegetation would be cut down and left on-unit at the TAOU. Vegetation would not be placed under the cap because large amounts of biodegradable material under the cap could result in structural damage through subsidence. The surface of the unit would be grubbed to remove tree stumps and the surface would be graded in preparation for the cap. Additional clean soil would be brought to the unit from an approved fill-material source (e.g., Three Rivers Landfill), pursuant to standard sampling and analytical protocols to confirm fill composition. Standard erosion control measures such as silt fences and hay bales would be used during construction to manage erosion. The cap would be constructed of a low permeability geosynthetic material that would provide sufficient infiltration control to mitigate CM COCs. Leachability calculations indicate that a typical low permeability cap utilizing geosynthetic material would sufficiently manage the leachability concern. The cap would contain a drainage layer above the low permeability layer, and would be topped with a vegetative cover that complies with Executive Order 13112, as appropriate, given the design limitations (i.e., native vegetation) (see Figure 14). Certain

structures, such as remediation and monitoring wells, would penetrate the cap at a few locations. Wells within the cap borders will be modified to extend above the cap. The structures would be flashed and sealed to prevent leakage (see Figure 15) and would be constructed per R.61-71 of the South Carolina Well Standards. Although not shown, all wells penetrating the cap will be constructed with a standard well pad. Following construction, the cap will receive periodic inspections to identify maintenance and repair actions required to ensure its continued function. The requirements and schedule for cap maintenance and inspections will be included in a unit-specific LUCIP (see Section IX for further discussion).

PTSM in the OTSB would be removed from T Area. Residual contamination would remain in the following locations:

1. At depth (assumed 1.2 to 8.2 m [4 to 27 ft] bls) in the OTSB; however, there are no human health or ecological exposure pathways, and the leachability threat will be negligible because the OTSB will be under the low permeability cap.

2. At depth greater than 1.2 m (4 ft) bls in the Upper and Lower Discharge Gully; however, the human health and ecological exposure pathways will be broken and the leachability threat will be negligible because the Upper and Lower Discharge Gully will be under the low permeability cap.

3. At depth (assumed 1.2 to 6.7 m [4 to 22 ft] bls) in the NTSB; however, the human health and ecological exposure pathways will be broken because the NTSB will be under backfill.

4. In groundwater greater than the MCL (until remedial actions to groundwater are complete). The 906-T Air Stripper will remain in operation to allow continued remediation of VOCs in groundwater.

5. At the surface and in the subsurface in the Outfall Delta and Inner Swamp. The highest levels of contamination would be removed under a RSER/EE/CA, but residual contamination would remain in the surface and subsurface. As part of the RSER/EE/CA, the remaining soil/sediment will be treated with soil amendments placed on the floor of the open excavation. After soil removal and placement of the soil amendments, the excavated areas will be restored by backfilling with clean soil and the surface returned to original grade. After the soil removal, the residual leachability threat in the unexcavated areas will be mitigated by the application of soil amendments in the Outfall Delta and Inner Swamp (approximately 5.7 ac) Soil amendments will include apatite (a natural calcium-phosphate material) and may include zero-valent iron if needed. These amendments tend to fix the CM COCs, thereby attenuating leaching to groundwater. The degree of fixation of site contaminants by these treatment materials is described in *Reduction of Contaminant Mobility at the TNX Outfall Delta through the use of Apatite and Zero-Valent Iron as Soil Amendment* (WSRC 2002b). The current vegetation in the swamp would not need to be destroyed.

6. At depths up to 13.7 m (45 ft) bls in the TBG; however, the human health and ecological exposure pathways will be broken and the leachability threat will be negligible because the TBG will be under the low permeability cap. The SVE System will continue to operate.

7. At depth (1.2 to 4.9 m [4 to 16 ft] bls) near the Neutralization Sump 678-T; however, the sump and soil exceeding $1X10^{-3}$ risk will be excavated as part of the remedial actions at the OTSB; this will be covered by an ESD to the TNX Area OU ROD. In addition, there are no human health or ecological exposure pathways, and the leachability threat will be negligible because this area will be under the low permeability cap.

8. On building slabs (under the low permeability cap). The highest levels of contamination were addressed under the SDD program, but residual contamination exceeding $1x10^{-6}$ risk (future industrial worker) may remain. The human health exposure pathway will be broken because the material will be under the low permeability cap.

Since contamination would be left at the unit, institutional controls would be maintained to prevent unrestricted land use. Institutional controls are administrative measures taken to minimize the potential for human exposure. Institutional controls would be used to prevent access by the public and control future land use. This would include continued use of SRS security guards, patrols, and fences at SRS. Institutional controls would also consist of administrative procedures to control activities by SRS workers, including prevention of unauthorized excavation or disturbance of the unit. Signs would be posted and maintained in the industrialized part of T Area to indicate that the contamination remains buried at depth. At the Outfall Delta and Inner Swamp, signs would be installed and maintained to prevent trespassers from inadvertently accessing these areas.

Groundwater would continue to be monitored and reported annually in the Comprehensive TNX Area Annual Groundwater and Effectiveness Monitoring Strategy Report. The groundwater corrective action would continue as specified in the TNX Area OU ROD.

This remedy would take less than 1 year to construct, and protection would be immediate. The costs for this alternative are as follows:

Total Capital Cost:	$11.1	million
Total O&M Cost (NPV):	$3.1	million
Total Cost (NPV):	$14.3	million

X. COMPARATIVE ANALYSIS OF ALTERNATIVES

Each of the remedial alternatives is evaluated against the nine criteria established by the NCP, 40 CFR 300. The criteria are derived from the statutory requirements of CERCLA Section 121. The criteria provide the basis for evaluating the alternatives and selecting a remedy. The nine criteria are as follows:

Threshold Criteria:

1. Overall Protection of Human Health and the Environment
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) (Table 8)

Primary Balancing Criteria:

1. Long-Term Effectiveness and Permanence
2. Reduction of Toxicity, Mobility, or Volume Through Treatment
3. Short-Term Effectiveness
4. Implementability
5. Cost

Modifying Criteria:

1. State Acceptance

2. Community Acceptance

Comparative Analysis for the TAOU

The remedial alternatives for the TAOU were evaluated using these 9 criteria as briefly summarized below. Table 9 presents a summary of the evaluation.

Overall Protection of Human Health and the Environment: Alternative 2 and Alternative 3 would provide overall protectiveness of human health through the use of institutional controls to control future land use. Institutional controls would include land use restrictions to prevent unauthorized excavation into contamination that remains at depth. Institutional controls would also minimize the likelihood that trespassers would enter the Outfall Delta and Inner Swamp frequently enough to sustain an unacceptable exposure. Alternative 2 and 3 would also eliminate human health exposure to residual contaminants in the industrial portion of T Area by placement of the engineered cap.

With respect to providing protection of human health, Alternative 1 would not be protective. It would not meet the RAO to protect the potential likely receptors. Contamination in the industrialized portion of T Area would pose a risk greater than $1x10^{-6}$ to a future industrial worker, and contamination in the Outfall Delta and Inner Swamp would pose a risk greater than $1x10^{-6}$ to a trespasser.

With respect to providing overall protection of the environment, Alternative 2 and Alternative 3 both would mitigate the leachability threats by placing a low permeability cap over CM COCs in the industrialized portion of T Area and by placing soil amendments in the Outfall Delta and Inner Swamp. Alternative 1 provides no protection against the leachability threats.

Compliance with ARARs:

Alternative 2 and Alternative 3 would comply with ARARs (Table 8). Chemical-specific ARARs would be met through containment of the wastes and continued USDOE institutional control, and/or through removal of the contamination. Standard construction practices, including standard worker safety procedures and measures to control dust and stormwater runoff, would be followed during remediation to comply with action-specific and location-specific ARARs. Waste would be handled, transported, and disposed in accordance with radioactive waste management regulations.

Alternative 1 would not comply with ARARs, including the Atomic Energy Act, 10 CFR 835, and South Carolina drinking water regulations. Compliance with the Atomic Energy Act would not be assured because USDOE would not be committed to maintain control over the wastes and the posting requirements (i.e., signs) would not be met. It would not comply with South Carolina drinking water regulations because it would not prevent continued leaching of contamination to groundwater above MCLs.

Long-Term Effectiveness and Permanence: With respect to long-term effectiveness for human health, the magnitude of residual risk associated with Alternative 1 would be the same as current conditions.

The risks are above background levels and the target risk level of $1x10^{-6}$. Contaminants in the TBG/Neutralization Sump 678-T may pose an unacceptable risk to a future industrial worker (uranium-238 risk is $2x10^{-6}$) and would pose a leachability threat to groundwater. Contaminated soil from the X-001 Outfall Drainage Ditch OU removal action (uranium-238 industrial worker risk of $1x10^{-5}$), contaminated soil from the Tile Field #2 removal action (leachability threat), and contaminated soil/sediment from the TNXOD OU removal action (recreational trespasser risk of up to $2x10^{-5}$ from thorium-228 plus daughter

products) would remain stockpiled in the industrialized portion of T Area and may pose an unacceptable risk to a future industrial worker and/or pose a leachability threat to groundwater quality. Residual contamination remaining in the TNXOD OU after the removal action (up to 35 pCi/g thorium-228) would pose an unacceptable exposure risk to a future trespasser and may pose a leachability threat to groundwater. Uncertainty associated with the residual risk posed by some of the building slabs and historical facilities in T Area would not be reduced.

Alternative 2 and Alternative 3 would involve containment of contamination under the T-Area cap. The surface of the cap would exhibit risk levels comparable to background levels. No COCs posing unacceptable risk would be left uncovered in the industrialized portion of T Area. In the Outfall Delta and Inner Swamp, the residual risk to a trespasser after the removal action would be in the 10^{-5} range. Both alternatives would include institutional controls to prevent unacceptable exposure to potential receptors. Uncertainty associated with the residual risk posed by the building slabs and historical facilities in T Area would be reduced by covering the suspect facilities with the cap.

With respect to long-term effectiveness for the environment, Alternative 2 and Alternative 3 both would mitigate the leachability threats. Both include a low permeability cap over CM COCs in the industrialized portion of T Area, including (1) the TBG and Neutralization Sump 678-T and (2) the CM COCs stockpiled in T Area that were removed under RSER/EE/CAs from Tile Field #2, the Outfall Delta, and the Inner Swamp. The cap would cover most of the TNX Area Process Sewer Lines, thus mitigating uncertainty regarding the leachability risk posed by any unidentified contamination that might exist. The potential leachability threat posed by any remaining contamination in the Outfall Delta and Inner Swamp would be reduced by the application of soil amendments to the surface in the rest of the TNXOD OU. Alternative 1 provides no protection against the leachability threats.

With respect to permanence, Alternative 1 has no remedy components to fail, but protectiveness is not attained. For Alternative 2 and Alternative 3, institutional controls are generally considered permanent, although there is some uncertainty with the ability to maintain them in the very long-term. In addition, access controls such as signs may not be completely effective. While there are no natural features or characteristics of the area that would tend to attract a trespasser more than the other floodplain areas along the river, knowledge of a former research area might encourage the curious individual to deliberately trespass. Therefore, the deliberate trespasser was selected as the preferred scenario for evaluating risk for this operable unit. A deliberate trespasser who ignores the warning signs at the Outfall Delta and Inner Swamp could be exposed to the contaminated area; however, it is unlikely that such a trespasser would frequent the area often enough and long enough to sustain an unacceptable dose. Additionally, because the area is part of thousands of acres of similar Savannah River floodplain habitat on and off the SRS, the probability that an inadvertent trespasser would frequent the area is very low.

A cap is subject to erosion and deterioration, and the effectiveness would decrease if maintenance is terminated. Permanence can be achieved through inspection and maintenance associated with institutional controls. Periodic maintenance of the cap would be needed indefinitely to maintain infiltration control.

Soil amendments can be permanent if carefully selected to provide long-term effectiveness. Soil amendments such as apatite can retain contaminants indefinitely when the contaminants are adsorbed into the mineral structure by isomorphic substitution. Flooding of the Savannah River (and associated erosion and redistribution of material) may require the soil amendments to be re-applied. Field walkdowns would be performed after major floods to identify if erosion has occurred and assess the need for maintenance or re-application. A monitoring plan would be developed to establish the criteria for conducting field walkdowns and performing maintenance/re-application.

The offsite disposal component of Alternative 3 is the most permanent solution, since the excavated material is permanently removed from the unit.

Reduction of Toxicity, Mobility, or Volume through Treatment:

Alternative 2 and Alternative 3 do not include any treatment that would reduce the toxicity. There would be no reduction in toxicity in the Outfall Delta and Inner Swamp. However, Alternative 2 would mitigate potential risk by excavation and containment of the highest levels of residual contamination under the T-Area cap. This removes the receptor from exposure to wastes. Alternative 3 further reduces potential threat to site receptors by transfer of excavated sediment/soil from the X-001 Outfall Drainage Ditch OU, Tile Field #2, and TNXOD OU to an offsite receiving facility.

Under Alternative 2 and Alternative 3, the leachability threat will be negligible for all areas located beneath the T Area cap. The leachability threat is further reduced under Alternative 3 through transfer of contaminated sediment/soil from the X-001 Outfall Drainage Ditch OU, Tile Field #2, and TNXOD OU to an offsite receiving facility. Mobility of contaminants in the Outfall Delta and Inner Swamp is also reduced by runoff control associated with the proposed cap and the addition of soil amendments.

Alternative 2 would not result in any reduction in volume. Alternative 3 would reduce the volume by up to 3,583 m^3 (4,687 yd^3). This represents a decrease of less than 7 percent of the total volume of contaminated media in T Area.

Alternative 1 does not provide any form of treatment to reduce the toxicity, mobility, or volume of contaminated media. Further, there would be no significant reduction in contamination from natural attenuation processes such as radioactive decay because the radioactive isotopes present are very long-lived. The toxicity, mobility, and volume would remain the same as current baseline conditions.

Short-Term Effectiveness: Alternative 1 provides short-term effectiveness because there would be no remedial activities that would potentially adversely impact the public, remedial workers, or environment during implementation. Since there would be no on-unit remediation, there would not be any risk associated with implementation of the remedy (such as construction risks, waste handling risks, etc.).

Alternative 2 requires heavy equipment use to construct the T-Area cap. There would be limited exposure to radiation effects when the cap is being constructed. Alternative 3 would be similar, but would involve some additional exposure to radiation effects when the wastes are being handled and processed for offsite disposal. Using established health and safety procedures, potential short-term risks to remedial workers are manageable for Alternative 2 and Alternative 3.

Alternative 3 is the only alternative that would pose risk to the community. This would be the exposure risk posed by transporting contaminated soils over public railways and/or roadways to an off-SRS disposal facility. However, this risk is small due to the generally low concentrations of contaminants, and can be mitigated using established transportation and health and safety procedures.

None of the alternatives would pose any significant risk to the environment. Risks from stormwater runoff and erosion are mitigated by standard erosion control measures.

With respect to the time until protection is achieved, Alternative 1 could be implemented immediately; however, protectiveness would not be achieved. Alternative 2 and Alternative 3 would achieve protectiveness upon implementation. For Alternative 2 and Alternative 3, the estimated time to perform the remedial action is 1 year. The time to complete the implementation and achieve the RAOs is not a key consideration in remedy selection because (1) the unit is within SRS boundaries and does not pose a threat to the community,

(2) the unit does not pose an imminent threat to the environment, and (3) SRS employees are protected by established SRS procedures.

Implementability: Alternative 1 is the most readily implementable because it involves no construction.

Alternative 2 and Alternative 3 are readily implementable. Excavation and construction techniques are standard and implementation should be routine. Use of institutional controls is also a routine process with no implementability restrictions.

For Alternative 3, the waste will need to be evaluated to ensure it meets the waste acceptance criteria of the anticipated offsite disposal facility. Further, off-SRS transportation of radioactive waste may cause public concern.

Cost: Alternative 1 is the least expensive ($0). The estimated NPV total cost for Alternative 2 is $11.1 million. The estimated NPV total cost for Alternative 3 is $14.3 million.

State Acceptance: USDOE, SCDHEC, and USEPA are working together through the Core Team process to achieve acceptance of the path forward for the TAOU. Approval of the TAOU ROD by SCDHEC and USEPA will constitute acceptance of the preferred alternative by the regulatory agencies.

Community Acceptance: The SB/PP for the TAOU will provide for community involvement through a document review process and a public comment period. Public input will be documented in the Responsiveness Summary section of the TAOU ROD.

XI. THE SELECTED REMEDY

Detailed Description of the Selected Remedy

Based upon the characterization data and risk assessments in the RFI/RI/BRAs (WSRC 1999, WSRC 2002a), the RAOs, and the evaluation of alternatives in the RI/FFS/RA for the TAOU (WSRC 2005a), the preferred alternative for the TAOU is Alternative 2 (Dispose Staged Wastes Onsite, Cap Residual Contamination, Place Soil Amendments in Outfall Delta and Inner Swamp, and Implement Institutional Controls).

After removal and offsite disposal of the PTSM from the OTSB/IPSL, as well as excavation of soil and sump materials exceeding $1x10^{-3}$ risk from buildings 677-T and 678-T (as specified in the TNX Area OU ROD and ESD to the TNX Area OU ROD), a low permeability cap would be constructed in the industrialized portion of T Area. The cap would be placed over residual contamination that may pose a contaminant migration and/or exposure threat (see Figure 13). In addition, soils excavated under RSER/EE/CA removal actions and stockpiled in the industrialized portion of T Area would be covered by the cap. The cap would be integrated with the 0.5 ha (1.2 ac) low permeability cap for the OTSB/IPSL/DG that is specified in the TNX Area OU ROD. The estimated additional area of the cap is 3.3 ha (8.2 ac) for a total area of 3.8 ha (9.4 ac) (Figure 13).

PTSM in the OTSB would be removed from T Area as specified in the TNX Area OU ROD. Residual contamination would remain in the following locations:

1. At depth (assumed 1.2 to 8.2 m [4 to 27 ft] bls) in the OTSB; however, there are no human health or ecological exposure pathways, and the leachability threat will be negligible because the OTSB will be under the low permeability cap.

2. At depth greater than 1.2 m (4 ft) bls in the Upper and Lower Discharge Gully; however, the human health and ecological exposure pathways will be broken and the leachability threat will be negligible because the Upper and Lower Discharge Gully will be under the low permeability cap.

3. At depth (assumed 1.2 to 6.7 m [4 to 22 ft] bls) in the NTSB; however, the human health and ecological exposure pathways will be broken because the NTSB will be under backfill.

4. In groundwater greater than the MCL (until remedial actions to groundwater are complete). The 906-T Air Stripper will remain in operation to allow continued remediation of VOCs in groundwater.

5. At the surface and in the subsurface in the Outfall Delta and Inner Swamp. The highest levels of contamination would be removed under a RSER/EE/CA and placed under the T-Area cap, but residual contamination would remain in the surface and subsurface. As part of the RSER/EE/CA, the remaining soil/sediment will be treated with soil amendments placed on the floor of the open excavation. After soil removal and placement of the soil amendments, the excavated areas will be restored by backfilling with clean soil and the surface returned to original grade. After the removal action, the residual leachability threat in the unexcavated areas will be mitigated by the application of soil amendments in the Outfall Delta and Inner Swamp (approximately 5.7 ac). Soil amendments will include apatite (a natural calcium-phosphate material) and may include zero-valent iron if needed. These amendments tend to fix the CM COCs, thereby attenuating leaching to groundwater. The current vegetation in the swamp would not need to be destroyed. The soil amendments may need to be re-applied if an erosional event, such as a flood, removes the shallow soil horizon and incorporated amendments in the treated area or if the concentration of COCs is confirmed to be increasing based on groundwater monitoring. Based on historical

records and studies of the Savannah River, up to a 100 year flood would not remove a significant portion of the shallow soil profile in the Inner Swamp. For the purposes of this ROD, reapplication of soil amendments is assumed at 10 and 20 years and then every 20 years thereafter. This is essentially equivalent to reapplication after a 20 year flood and represents a very conservative assumption given the known conditions at the site.

6. At depths up to 13.7 m (45 ft) bls in the TBG; however, the human health and ecological exposure pathways will be broken and the leachability threat will be negligible because the TBG will be under the low permeability cap. The SVE System will continue to operate.

7. At depth (1.2 to 4.9 m [4 to 16 ft] bls) near the Neutralization Sump 678-T; however, the sump and soil exceeding $1x10^{-3}$ risk were excavated as part of the remedial actions at the OTSB; this is covered by an ESD to the TNX Area OU ROD. In addition, there are no human health or ecological exposure pathways, and the leachability threat is negligible because the Neutralization Sump 678-T will be under the T Area low permeability cap.

8. In the industrialized portion of T Area where soils removed under RSER/EE/CAs are stockpiled (under the low permeability cap). This would include the soils and sediments from the Outfall Delta and Inner Swamp removal action, the soil from the X-001 Outfall Drainage Ditch OU removal action, and the soil from Tile Field #2 removal action. In addition, any non-PTSM soils and materials generated as part of the 677-T and 678-T remedial action may be stockpiled in the industrial portion of T Area. The human health exposure pathway will be broken because the material will be under the low permeability cap.

9. On building slabs, (under the low permeability cap). The highest levels of contamination were addressed under the SDD program, but residual

contamination exceeding $1x10^{-6}$ risk (future industrial worker) may remain. The human health exposure pathway will be broken because the material will be under the low permeability cap.

Groundwater would continue to be monitored and reported annually in the Comprehensive TNX Area Annual Groundwater and Effectiveness Monitoring Strategy Report. The groundwater corrective action would continue as specified in the TNX Area OU ROD.

No further remedial action is proposed for the X-001 Outfall Drainage Ditch OU or the Tile Field #2 because the contamination has been excavated under RSER/EE/CAs. These areas are within the area designated for institutional controls for T Area. This ROD proposes a final action for the excavated soils stockpiled in the industrialized portion of T Area. No action is proposed for the Swamp High Ground or Outer Swamp subunits of the TNXOD OU, Tile Field #1, Tile Field #3, and SEAs because there are no constituents warranting remedial action in these units.

Institutional controls would be maintained to prevent unrestricted land use. Institutional controls will be implemented by:

- Providing access controls for on-site workers via the Site Use Program, Site Clearance Program, work control, worker training, worker briefing of health and safety requirements, and identification signs located in T Area.

- Notifying the USEPA and SCDHEC in advance of any changes in land use or excavation.

- Providing access controls against trespassers as described in the 2000 RCRA Part B Permit Renewal Application, Volume I, Section F.1, which describes the security procedures and equipment, 24-hour surveillance system, artificial or natural barriers, control entry systems, and warning signs in place at the

SRS boundary. Signs would be posted and maintained at T Area to indicate that the contamination remains buried at depth. At the Outfall Delta and Inner Swamp, signs would be installed and maintained to prevent trespassers from inadvertently accessing these areas.

A detailed description of access controls is included in Table 10.

In the long term, if the property is ever transferred to nonfederal ownership, the U.S. Government will take those actions necessary pursuant to Section 120(h) of CERCLA. Those actions will include a deed notification disclosing former waste management and disposal activities as well as remedial actions taken on the site. The contract for sale and the deed will contain the notification required by CERCLA Section 120(h). The deed notification shall, in perpetuity, notify any potential purchaser that the property has been used for the management and disposal of waste. These requirements are also consistent with the intent of the RCRA deed notification requirements at final closure of a RCRA facility if contamination will remain at the unit.

The deed shall also include deed restrictions precluding residential use of the property. However, the need for these deed restrictions may be reevaluated at the time of transfer in the event that exposure assumptions differ and/or the residual contamination no longer poses an unacceptable risk under residential use. Any reevaluation of the need for the deed restrictions will be done through an amended ROD with USEPA and SCDHEC review and approval.

In addition, if the site is ever transferred to nonfederal ownership, a survey plat of the OU will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency.

The selected remedy for the TAOU leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for an indefinite period of time. As agreed on March 30, 2000, among the USDOE, USEPA, and

SCDHEC, SRS is implementing a Land Use Control and Assurance Plan (LUCAP) to ensure that the Land Use Controls (LUCs) required by numerous remedial decisions at SRS are properly maintained and periodically verified. The unit-specific LUCIP referenced in this ROD will provide details and specific measures required to implement and maintain the LUCs selected as part of this remedy. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs selected under this ROD. The LUCIP, developed as part of this action, will be submitted concurrently with the Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP), as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the LUCIP will be appended to the LUCAP and is considered incorporated by reference into the ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA and the *SRS Federal Facility Agreement.* The approved LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The LUCIP will remain in effect unless and until modifications are approved as needed to be protective of human health and the environment. The deed shall contain provisions to ensure that appropriate land use controls remain with the affected area upon any and all transfers. The LUCs shall be maintained until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use. Approval by USEPA and SCDHEC is required for any modification or termination of the institutional controls.

USDOE has recommended that residential use of SRS land be controlled; therefore, future residential use and potential residential water usage will be restricted to ensure long-term protectiveness. Land use controls, including institutional controls, will restrict the TAOU to future industrial use and will prohibit residential use of the area. Unauthorized excavation will also be prohibited and the waste unit will remain undisturbed. Land use controls selected

as part of this action will be maintained for as long as they are necessary and termination of any land use controls will be subject to CERCLA requirements for documenting changes in remedial actions.

The LUC objectives necessary to ensure the protectiveness of the selected remedy are

- prevent access or use of the groundwater, except for remedial/ monitoring purposes until cleanup levels are met;
- maintain the integrity of any current or future remedial or monitoring system such as monitoring wells;
- prevent inadvertent human contact with contaminated soil in the Outfall Delta and Inner Swamp;
- prohibit the development and use of property for residential housing, elementary and secondary schools, child care facilities and playgrounds; and
- ensure no construction on, excavation, or breaching of the low permeability cap.

Rationale for Selecting this Remedy

The rationale for proposing this remedy over the other alternatives includes the following:

- Institutional controls are an effective and low-cost method to mitigate the human health risks posed by T Area. Institutional controls will prevent unauthorized excavation into contamination that remains at depth. Institutional controls would also minimize the likelihood that trespassers

would enter the Outfall Delta and Inner Swamp frequently enough to sustain an unacceptable exposure.

- A low permeability cap is an effective and low-cost method to mitigate the leachability threats that warrant remedial action in the industrialized part of T Area.

- Soil amendments are an effective and low-cost method to mitigate the uncertainty with whether contamination in the Outfall Delta and Inner Swamp poses a leachability threat. The preventative costs of implementing soil amendments are very low compared to the high costs that could be incurred if a groundwater plume was to develop.

- Off-SRS disposal of contaminants excavated under RSER/EE/CAs was not selected due to the high cost and negligible benefit. Because it is not practicable to remove most of the contamination in T Area, there is little benefit to removing the small percentage (<7 percent) of waste volume that could be removed: the residual risk and available future land uses would be the same.

- Onsite containment of waste has several advantages over off-SRS disposal because (1) it avoids exposure of workers to radioactive and hazardous substances during shipping and disposal of staged wastes, (2) it avoids the public concern and risk to the community posed by transportation of contamination over public railways and/or roadways to an off-SRS disposal facility, and (3) it results in an estimated cost savings of $3.2 million.

- No Action was not selected because it does not meet the threshold criteria of providing overall protection of human health and it does not meet ARARs.

How the Selected Remedy will Meet the RAOs

The preferred alternative complies with ARARs and will meet the RAOs. The RAO to restrict T Area to industrial use will be met using institutional controls, which includes physical and administrative land use controls. The RAO to protect industrial workers from exposure to contaminants also will be met by institutional controls. Further protection is achieved by the low permeability cap in the industrialized part of T Area, which will shield SRS workers from contaminants at depth. The RAO to prevent trespassers from inadvertently accessing the Outfall Delta and Inner Swamp will be met by institutional controls, which will include physical and administrative land use controls. The RAO to prevent contaminants in the TBG, Outfall Delta, and Inner Swamp from leaching to groundwater and impacting groundwater above MCLs will be met by placing a low permeability cap over the TBG and by placing soil amendments in the Outfall Delta and Inner Swamp.

The proposed low permeability cap, soil amendments, and institutional controls are considered a reasonable remedy to mitigate the problems warranting action; however, there are always uncertainties. The primary uncertainty with the selected remedy for the Outfall Delta and Inner Swamp is whether the contamination poses an actual leachability threat and whether soil amendments are needed. Because the Savannah River floodplain vicinity is a regional groundwater discharge area having heterogeneous sediments, complex groundwater flowpaths, and groundwater/surface water interactions, it is unlikely that this uncertainty could be reduced by additional characterization or modeling. Soil amendments are selected as an effective, implementable, and low-cost method to reduce the uncertainty with the leachability threat. Another uncertainty is the ability to maintain institutional controls, including land use controls and cap maintenance, in the very long-term. This uncertainty will be mitigated by the Five-Year Review of the ROD remedial action and continued monitoring under the ROD, which will assess whether the remedy is performing as intended. The Five Year Review is a

statutory requirement imposed whenever hazardous substances remain onsite above levels that support unrestricted use/unlimited exposure. The selected remedy may be changed if the remedial goals are not being met. The condition that will trigger USDOE, SCDHEC, and USEPA to convene to evaluate options shall be the worsening of a discernable plume above MCLs. In addition, USDOE, SCDHEC, and USEPA shall convene if evidence of routine trespassing (e.g., recurring trash or campfires) is discovered in the Outfall Delta or Inner Swamp.

This remedy may change as a result of the remedial design or construction processes. Changes to the remedy described in the ROD will be documented in the Administrative Record utilizing a memo, and ESD, or ROD Amendment.

Cost Estimate for the Selected Remedy

The present worth cost for this remedy are as follows:

Total Capital Cost:	$8.0	million
Total O&M Cost (NPV):	$3.1	million
Total Cost (NPV):	$11.1	million

These costs include the cost of constructing the low permeability cap, placing soil amendments, establishing institutional controls, performing O&M for 100 years (i.e., general site maintenance, maintenance of institutional controls, periodic replenishment of soil amendments, and groundwater effectiveness monitoring), and performing a five-year ROD review. Cost estimates were generated using a 3.9% interest (discount) rate. The ROD remedial action will be reviewed every five years to assess whether the remedy is still meeting the RAOs. Although there is no time limit on the five-year review requirement or institutional controls, the

NPV for this long-term cost is negligible. Table 11 provides the detailed cost estimate for the selected remedy.

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record File, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to –30 percent of the actual project cost.

Estimated Outcomes of Selected Remedy

The expected condition after the preferred alternative is implemented is that the institutional controls will prevent access to human receptors, and the low permeability cap and soil amendments will prevent future leaching of CM COCs to groundwater above MCLs. The groundwater will be remediated as specified in the ROD for the TNX Area OU. The industrial part of T Area would be available for SRS use as an industrial area with land use restrictions, and the Outfall Delta and Inner Swamp will remain under institutional controls as a flood-prone area unsuitable for residential or industrial development. A summary of residual risk at the TAOU following implementation of this alternative is presented in Figure 16.

Waste Disposal and Transport

Some waste associated with protective clothing and decontamination of equipment will be generated during the implementation of the selected remedy. Any vegetation that needs to be cleared to implement the remedial action will be left at the unit. If any incidental wastes are generated, they will be managed and dispositioned in accordance with the Investigation-Derived Waste Management Plan (WSRC 2004d).

- All unused environmental samples may be returned to the waste site, within the Area of Contamination. This excludes samples that have had preservatives added.

- Decontamination solutions and rinsates from cleaning items intended for reuse or recycle (e.g., field sampling tools, equipment, or personal protective equipment) may be discharged to the ground surface at an area which will not runoff or cause erosion. This method for handling decontamination solutions does not require an engineering evaluation to determine a waste disposal strategy. Decontamination wash and rinse solutions typically include laboratory grade soap and deionized water, and laboratory grade isopropyl alcohol for residual organic compound stripping and tool drying. Any residual isopropyl alcohol must be containerized and combined with the soapy wash water before the solution is discharged to the ground surface, to avoid discharging an ignitable hazardous solution.

- Environmental sampling boreholes may be abandoned by backfilling with native soil. This is regardless of the level of contamination. The soil will be placed in the borehole in the reverse order as removed, to maintain the original stratigraphy.

- Any water that may collect in excavations will be tested to determine if it is contaminated. Water contaminated below PTSM soil levels may be managed under the T Area cap.

XII. STATUTORY DETERMINATIONS

Based on the unit RI/FFS/RA report (WSRC 2005a), the TAOU poses a threat to human health and the environment. Therefore, Alternative 2 (Dispose Staged Wastes Onsite, Cap Residual Contamination, Place Soil Amendments in Outfall Delta and Inner Swamp, and Implement Institutional Controls) has been selected as the remedy for the TAOU. The future land use of the TAOU is assumed to be

industrial (in the industrial area) and industrial buffer (in the lowland area to the southwest).

PTSM based on toxicity is not present at the TAOU. At the TBG (Previously-Inaccessible Areas), treatment or removal of the PTSM based on mobility is not practicable; consequently, engineering controls, such as containment through capping, will be used to manage the PTSM. Uncertainty regarding the residual leachability threat at the Outfall Delta and Inner Swamp will be mitigated by the application of soil amendments.

As presented in the unit RI/FFS/RA report (WSRC 2005a), the TNXOD OU Swamp High Ground and Outer Swamp subunits, Tile Field #1, Tile Field #3, and the TNX Area Process Sewer Lines do not pose a threat to human health and the environment. Therefore, no action is warranted for these areas. As presented in the RSER/EE/CA for the X-001 Outfall Drainage Ditch OU (WSRC 2004b) and the RSER/EE/CA for Tile Field #2 (WSRC 2004c), the soils remaining at the units after the excavation is completed do not pose a threat to human health and the environment. Therefore, no further action is warranted for these areas.

Based on the information currently available, USDOE, USEPA, and SCDHEC believe the selected remedy for the TAOU provides the best balance of tradeoffs among the other alternatives with respect to the evaluation criteria. The three parties expect the selected remedy to satisfy the statutory requirements in CERCLA Section 121(b) to (1) be protective of human health and the environment, (2) comply with ARARs, (3) be cost effective, and (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. However, use of engineering controls (such as containment through capping) combined with institutional controls and placement of soil amendments in the Outfall Delta and Inner Swamp is protective of human health and the environment and is consistent with expectations in the NCP.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

XIII. EXPLANATION OF SIGNIFICANT CHANGES

There were no significant changes made to the ROD based on the comments received during the public comment period for the SB/PP. Comments that were received during the public comment period are addressed in the Responsiveness Summary included in Appendix B of this document.

XIV. RESPONSIVENESS SUMMARY

The Responsiveness Summary is included as Appendix B of this document.

XV. POST-ROD DOCUMENT SCHEDULE AND DESCRIPTION

Figure 17 is an implementation schedule for the TAOU showing the post-ROD document submittals and the remedial action start date.

Major milestones are as follows:

- The Rev. 0 CMI/RAIP for the TAOU will be developed and submitted for USEPA/SCDHEC review on July 29, 2005. ROD approval and signature is expected November 12, 2005.

- Regulatory review of the Rev. 0 CMI/RAIP is anticipated to be complete October 28, 2005 (90 calendar days).

- SRS revision of the CMI/RAIP will be completed 60 calendar days after receipt of all regulatory comments (December 27, 2005).

- Regulatory approval of the CMI/RAIP is expected January 26, 2006.

- The remedial action start date is anticipated to be January 26, 2006.

- Construction is forecasted to be completed by July 17, 2006.

- SRS will submit a post-construction report (Final Remediation Report, with the LUCIP as an appendix) approximately 90 days after construction is complete (i.e., after completion of a post-construction walkdown and acceptance by the USDOE, USEPA, and SCDHEC).

- The Comprehensive TAOU Annual Groundwater and Effectiveness Monitoring Strategy Report will be submitted to USEPA and SCDHEC within six months after the yearly fourth quarter sampling is completed. Annual submittals will continue until target groundwater levels are achieved or the Core Team concurs that no significant risk to receptors is present.

XVI. REFERENCES

FFA 1993. *Federal Facility Agreement for the Savannah River Site,* Administrative Docket No. 89-05-FF (Effective Date: August 16, 1993)

USDOE 1994. *Public Involvement, A Plan for the Savannah River Site,* Savannah River Operations Office, Aiken SC

USDOE 1996. *Savannah River Site: Future Use Project Report*, Stakeholder Recommendations for SRS Land and Facilities. January 1996. Cover letter: Fiori, Mario P., "SRS Future Use Project Report (Reference: Transmittal of Final Draft "Forging the Missing Link: A Resource Document for Identifying Future Use Options," Grumbly/Pearlman letter, 1-12-94)", United States Department of Energy Letter EB-96-015, Savannah River Site, Aiken, South Carolina 29808 (January 29).

WSRC 1999. *RCRA Facility Investigation/Remedial Investigation Report with Baseline Risk Assessment for the TNX Area Operable Unit*, WSRC-TR-96-00808, Rev. 1.2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina.

WSRC 2002a. *RFI/RI with Baseline Risk Assessment for the TNX Outfall Delta, Lower Discharge Gully, and Swamp Operable Unit,* WSRC-RP-98-4158, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (August).

WSRC 2002b. *Reduction of Contaminant Mobility at the TNX Outfall Delta through the use of Apatite and Zero-Valent Iron as Soil Amendments*, WSRC-RP-2002-00370, Rev. 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (September).

WSRC 2003a. *Record of Decision Remedial Alternative Selection for the TNX Area Operable Unit*, WSRC-RP-2003-4017, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (August).

WSRC 2003b. *Corrective Measures Study/Feasibility Study for the TNX Outfall Delta, Lower Discharge Gully, and Swamp Operable Unit*, WSRC-RP-2002-4201, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (November).

WSRC 2004a. *Removal Site Evaluation Report/ Engineering Evaluation and Cost Analysis for the TNX Outfall Delta, Lower Discharge Gully and Swamp Operable Unit*, WSRC-RP-2004-4055, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (August).

WSRC 2004b. *Removal Site Evaluation Report/ Engineering Evaluation and Cost Analysis for the X-001 Outfall Drainage Ditch Operable Unit, NBN*, WSRC-RP-2004-4018, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (May).

WSRC 2004c. *Removal Site Evaluation Report/Engineering Evaluation and Cost Analysis for the Tile Field #2, NBN*, WSRC-RP-2004-4027, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (August).

WSRC 2004d. *Investigation-Derived Waste Management Plan*, WSRC-RP-94-1227, Rev. 7, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (December).

WSRC 2005a. *Remedial Investigation/Focused Feasibility Study/Risk Assessment for the T Area Operable Unit*, WSRC-RP-2004-4050, Rev. 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (May).

WSRC 2005b. *Decommissioning Project Final Report- Administrative and Laboratory Building, 679-T,* V-PCOR-T-00015, Rev. 2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC 2005c. *Decommissioning Project Final Report- Analytical Laboratory, Building 772-T,* V-PCOR-T-00017, Rev. 2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC 2005d. *Decommissioning Project Final Report- Chemical Semi-Works Building, 678-T,* V-PCOR-T-00007, Rev. 3, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC 2005e. *Decommissioning Project Final Report- Containerization Equipment Development Facility, Building 673-T,* V-PCOR-T-00012, Rev. 2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC, 2005f. *Decommissioning Project Final Report- Cooling Tower, 672-1T,* V-PCOR-T-00011, Rev. 2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC 2005g. *Decommissioning Project Final Report- DWPF Semi-Works, Building 672-T,* V-PCOR-T-00003, Rev. 3, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC 2005h. *Decommissioning Project Final Report- Effluent Treatment Plant, Building 904-T,* V-PCOR-T-00018, Rev. 2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC 2005i. *Decommissioning Project Final Report- Fire Pump House, Building 679-8T,* V-PCOR-T-00014, Rev. 2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC 2005j. *Decommissioning Project Final Report- Melter Demonstration and Multiple Process Facilities, Building 675-T,* V-PCOR-T-00013, Rev. 2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC 2005k. *Decommissioning Project Final Report- Organic Removal Facility, Building 607-46T,* V-PCOR-T-00009, Rev. 2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC 2005l. *Decommissioning Project Final Report- Pilot Plant, Building 677-T,* V-PCOR-T-00006, Rev. 2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC 2005m. *Decommissioning Project Final Report- Precipitate Hydrolysis Experimental Facility, Building 682-T,* V-PCOR-T-00016, Rev. 2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC 2005n. *Decommissioning Project Final Report- Tank Gallery, 671-T,* V-PCOR-T-00010, Rev. 2, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (February).

WSRC 2005o. *Decommissioning Project Final Report- TNX Administration Building, 704-T,* V-PCOR-T-00022, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (January).

WSRC 2005p. *Decommissioning Project Final Report- TNX Administration Building Annex, 704-1T,* V-PCOR-T-00021, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (January).

WSRC 2005q. *Decommissioning Project Final Report- TNX Carpenter Shop, Building 694-2T,* V-PCOR-T-00028, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (January).

WSRC 2005r. *Decommissioning Project Final Report- TNX Control Room, Building 692-T,* V-PCOR-T-00026, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (January).

WSRC 2005s. *Decommissioning Project Final Report- TNX Electrical Maintenance Building, 711-T,* V-PCOR-T-00023, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (January).

WSRC 2005t. *Decommissioning Project Final Report- TNX River Pump House, Building 681-4T,* V-PCOR-T-00024, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (January).

WSRC 2005u. *Decommissioning Project Final Report- TNX Sanitary Treatment Facility, Buildings 607-40T and 607-41T,* V-PCOR-T-00020, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (January).

WSRC 2005v. *Decommissioning Project Final Report- TNX Secondary Transformer Substation #3 (652-13T),* V-PCOR-T-00002, Rev. 3, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (January).

WSRC 2005w. *Decommissioning Project Final Report- TNX Solvent Storage Building, Building 684-T,* V-PCOR-T-00025, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (January).

WSRC 2005x. *Decommissioning Project Final Report- TNX Warehouse, Building 694-T,* V-PCOR-T-00027, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (January).

WSRC 2005y. *Decommissioning Project Final Report- TNX Water Services Chemical Addition Building, 679-7T,* V-PCOR-T-00029, Rev. 1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (January).

WSRC 2005z. *Statement of Basis/Proposed Plan for the T Area Operable Unit,* WSRC-RP-2004-4069, Rev. 1.1, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (May).

WSRC 2005aa. *Explanation of Significant Difference to the Record of Decision for the TNX Area Operable Unit,* WSRC-RP-2005-4030, Rev. 1.0, Westinghouse Savannah River Company, Savannah River Site, Aiken, South Carolina (June).

(This page intentionally left blank)

Figure 1. Location of T Area within SRS

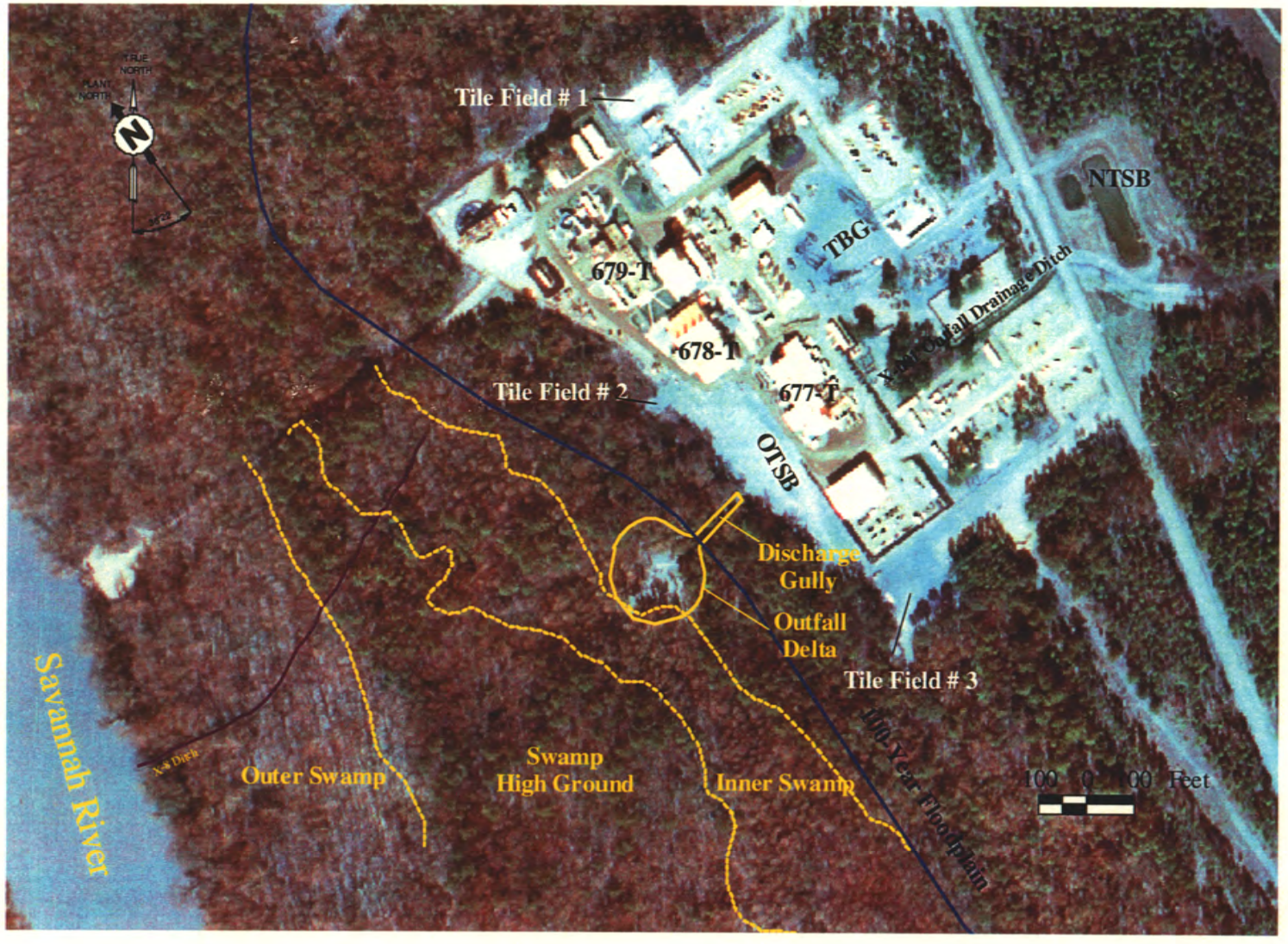


Figure 2. Aerial Photograph of T Area Industrial Area and Swamp (February 23, 1982)

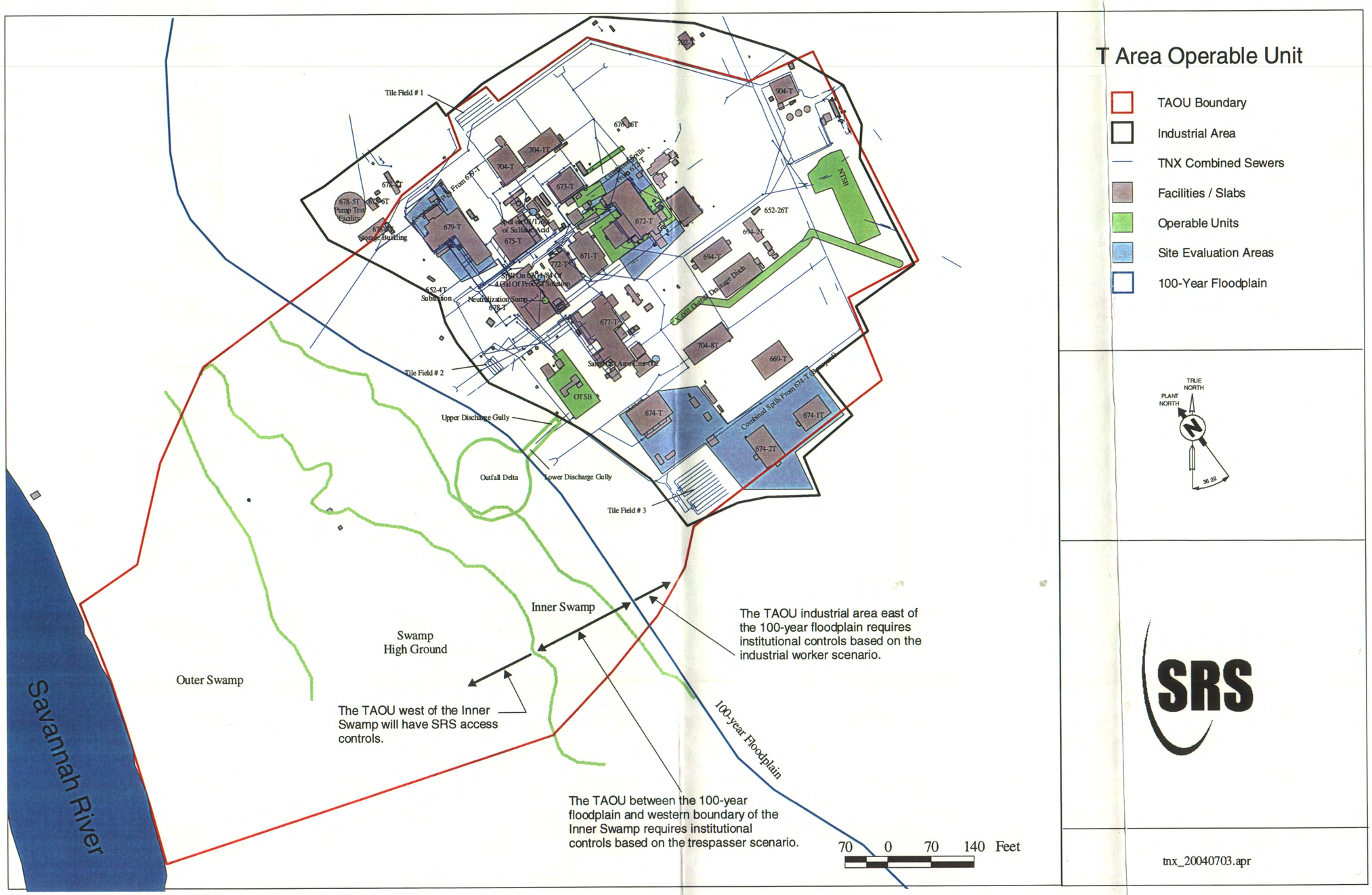


Figure 3. T Area Operable Unit

(This page intentionally left blank)

Figure 4. Aerial Photograph of T Area (January 11, 2005)

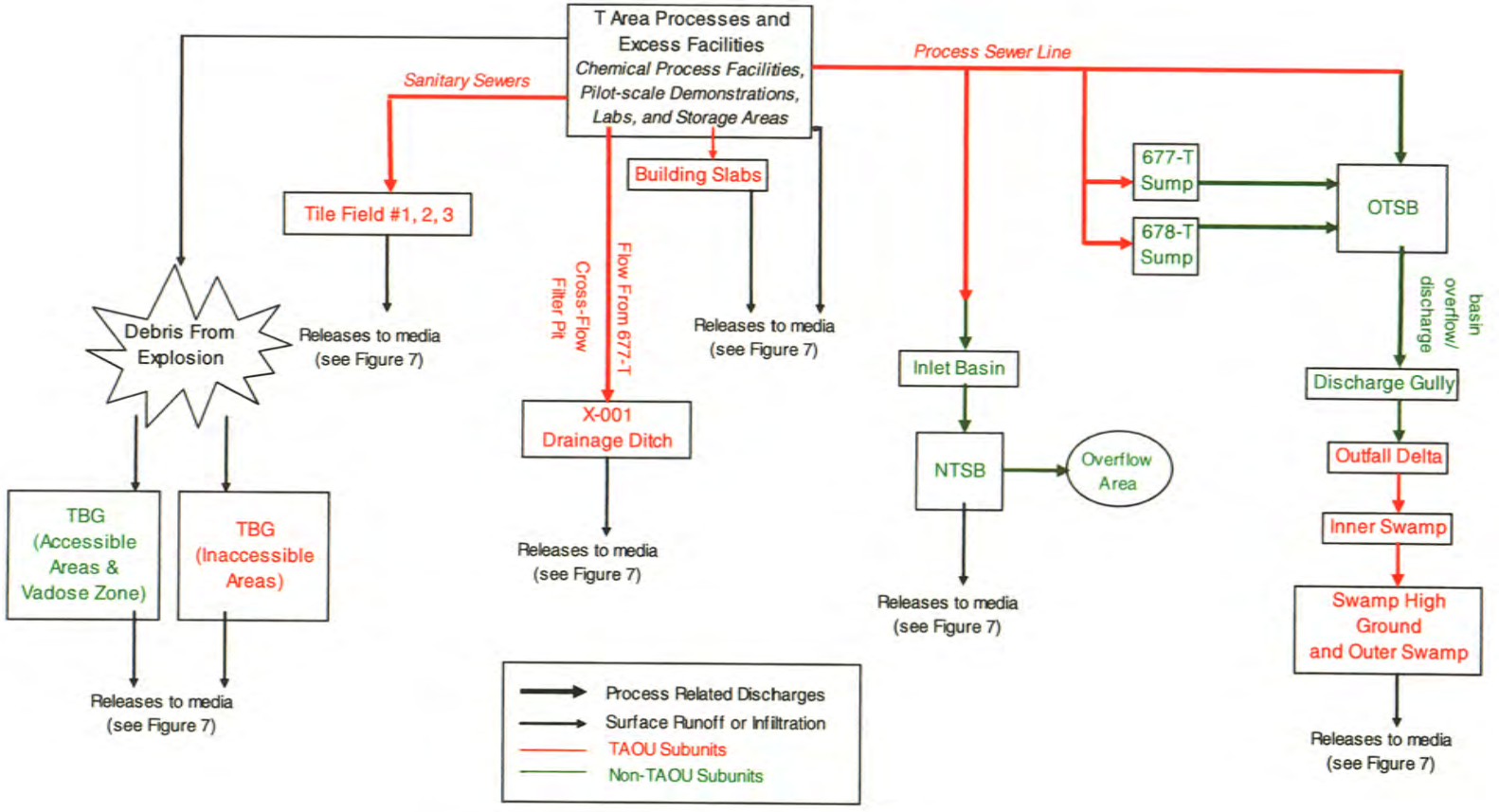


Figure 5. CSM: Overview of the TAOU

Figure 6. Existing T Area Facilities and Waste Units

(This page intentionally left blank)

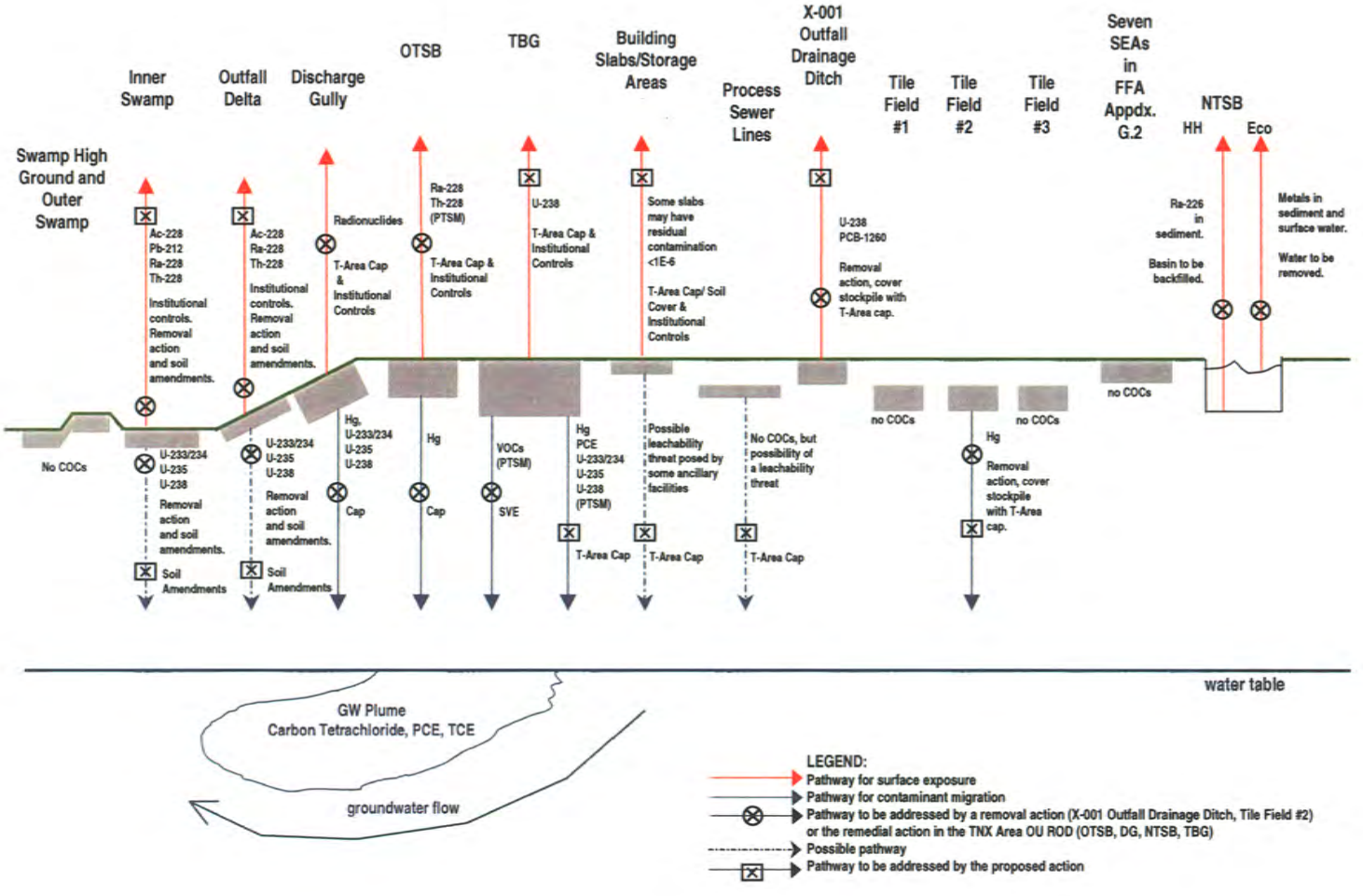


Figure 7. CSM for the TAOU

(This page intentionally left blank)

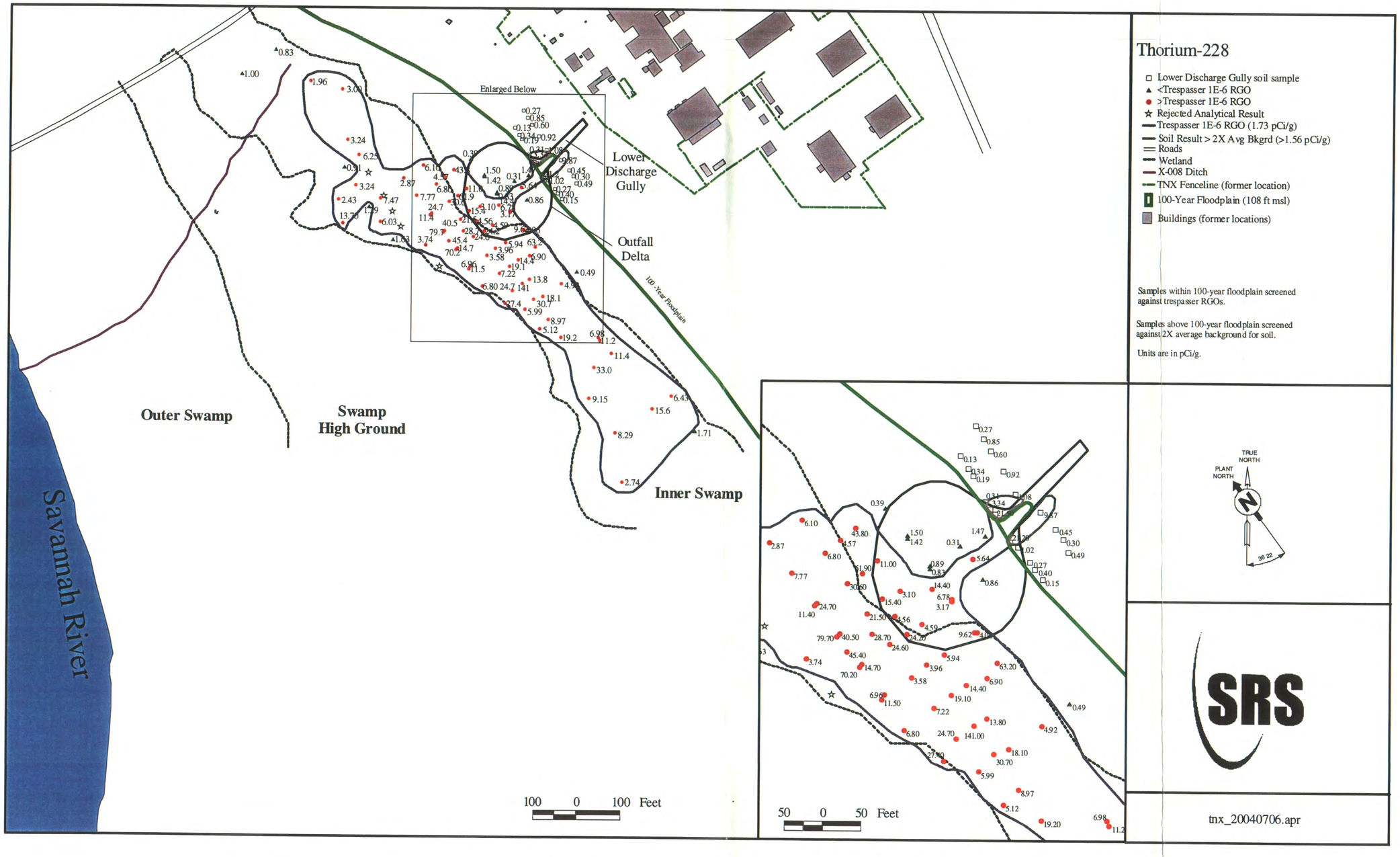


Figure 8. TNXOD OU Extent of Thorium-228 Contamination – Human Health – 0 to 0.3 m (0 to 1 ft)

(This page intentionally left blank)

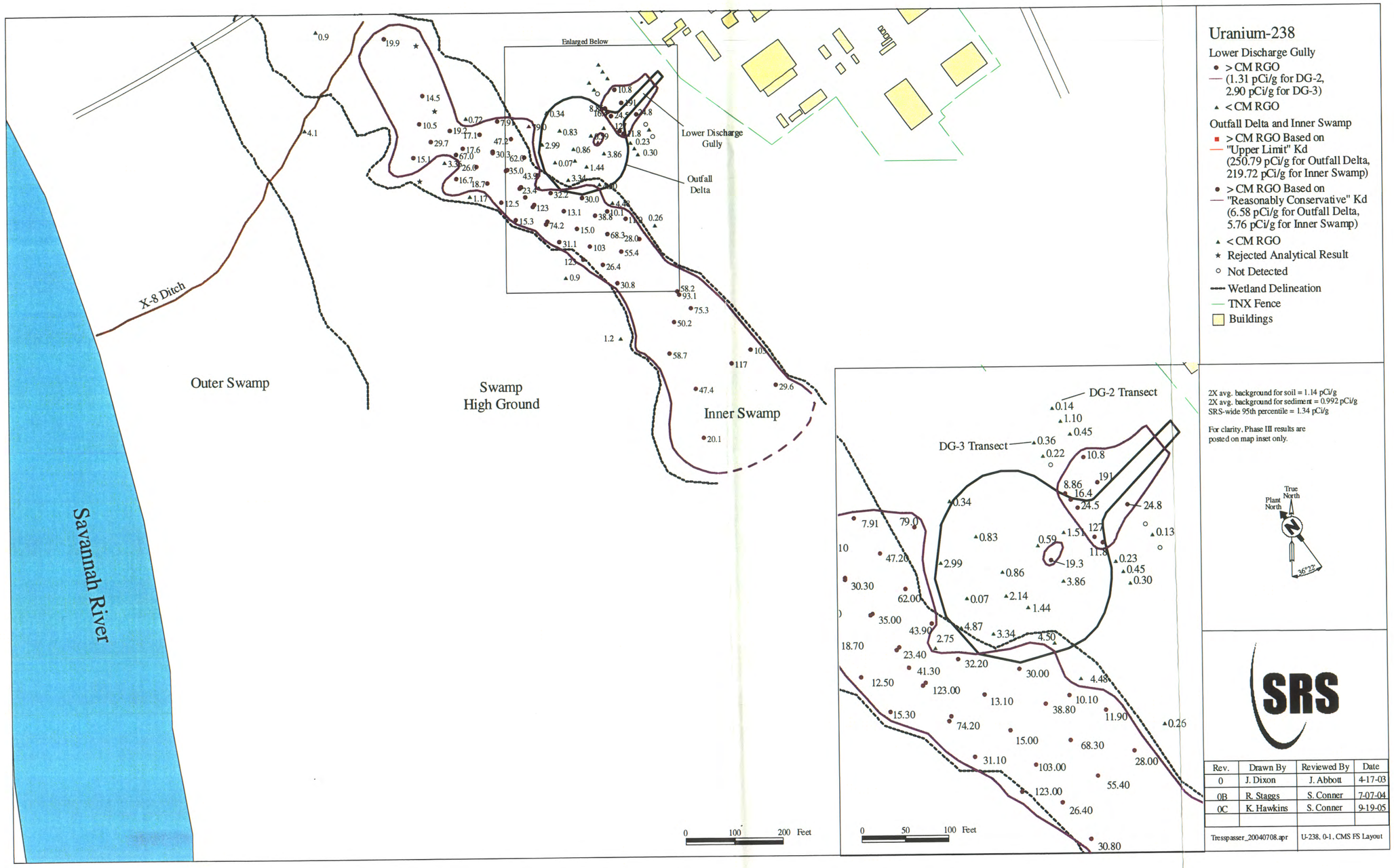


Figure 9. TNXOD OU Extent of Uranium-238 Contamination – Contaminant Migration – 0 to 0.3 m (0 to 1 ft)

(This page intentionally left blank)

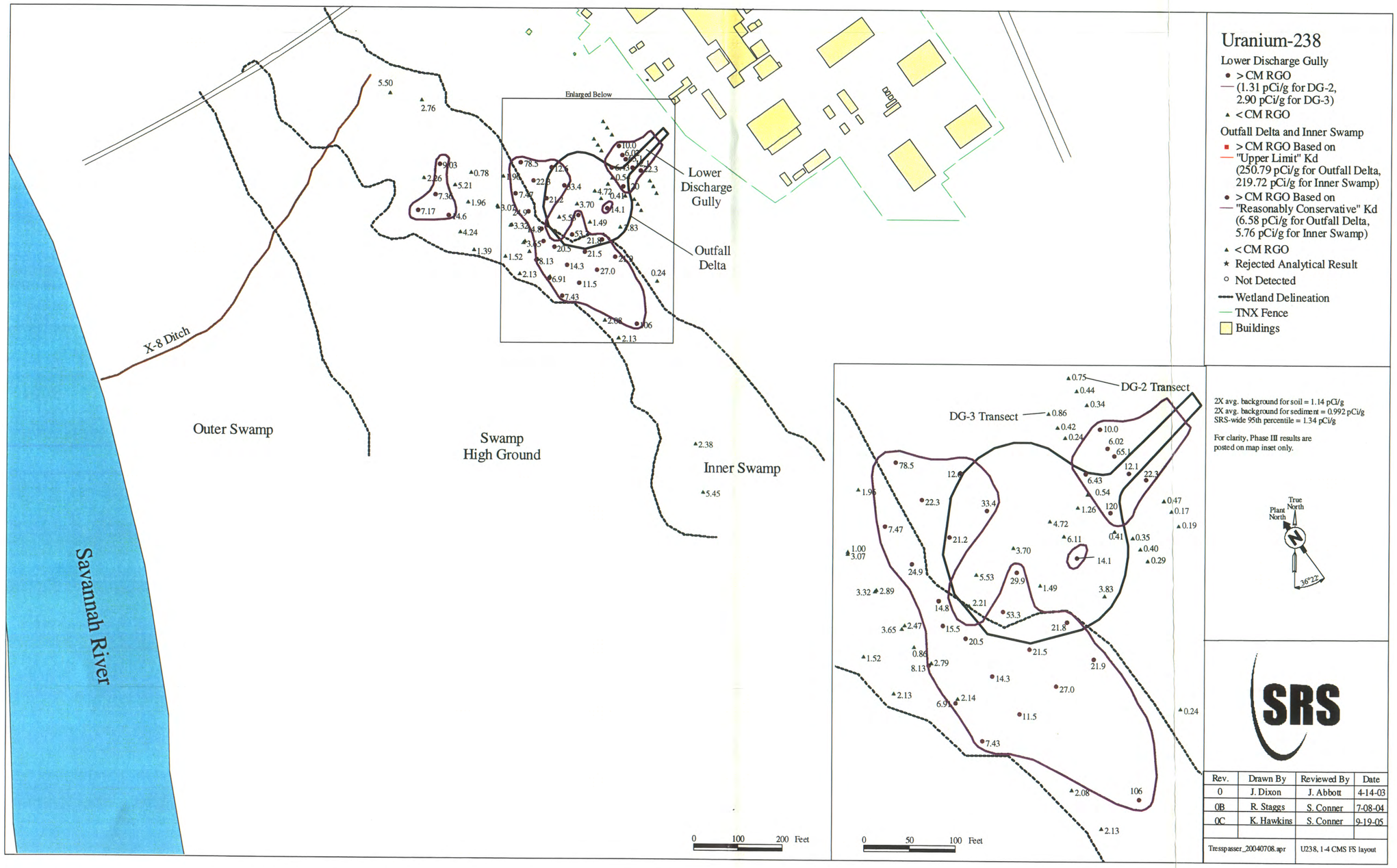


Figure 10. TNXOD OU Extent of Uranium-238 Contamination – Contaminant Migration – 0.3 to 1.2 m (1 to 4 ft)

(This page intentionally left blank)

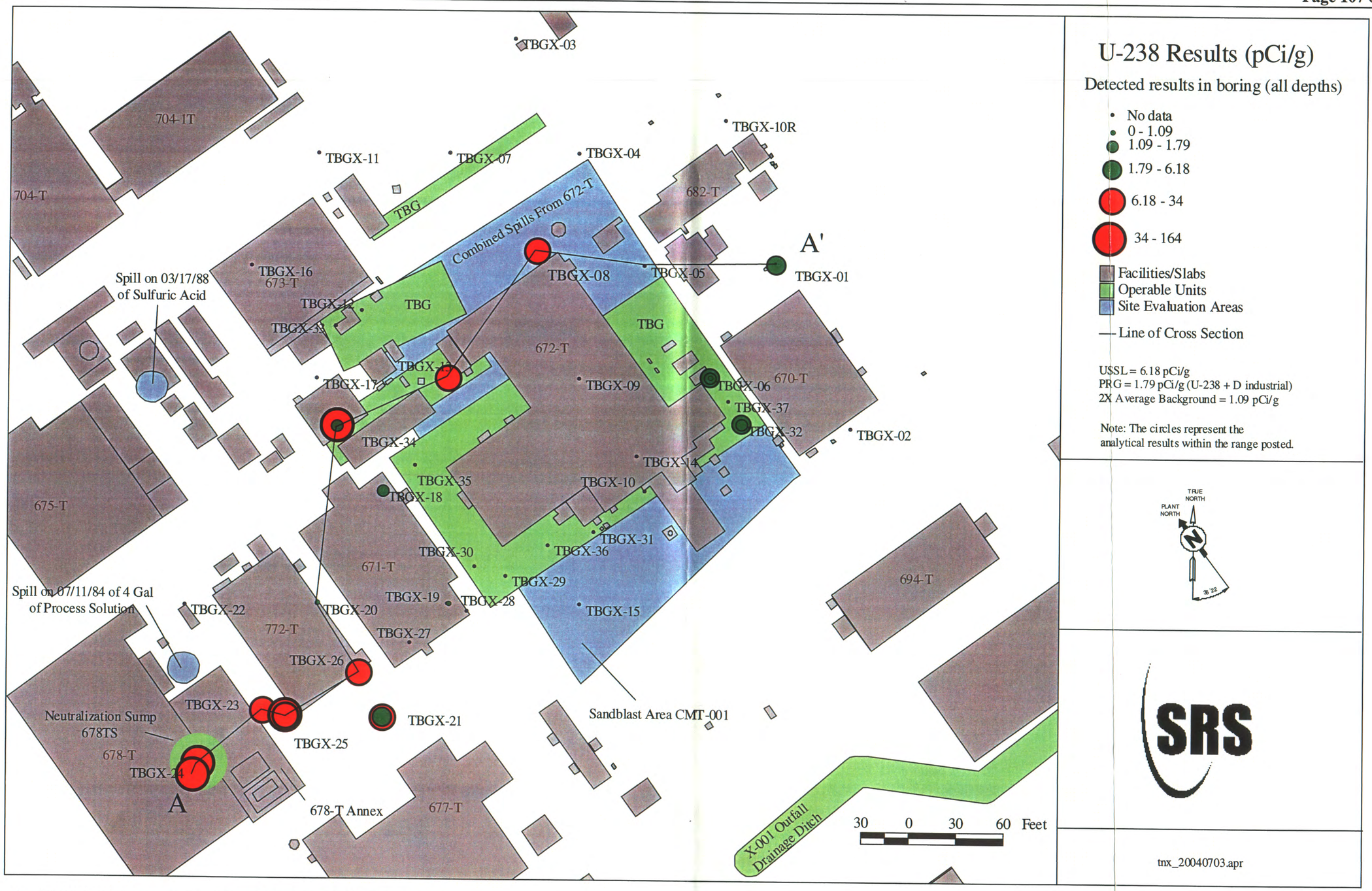


Figure 11. TBG Extent Contamination – Uranium-238 in Plan View

(This page intentionally left blank)

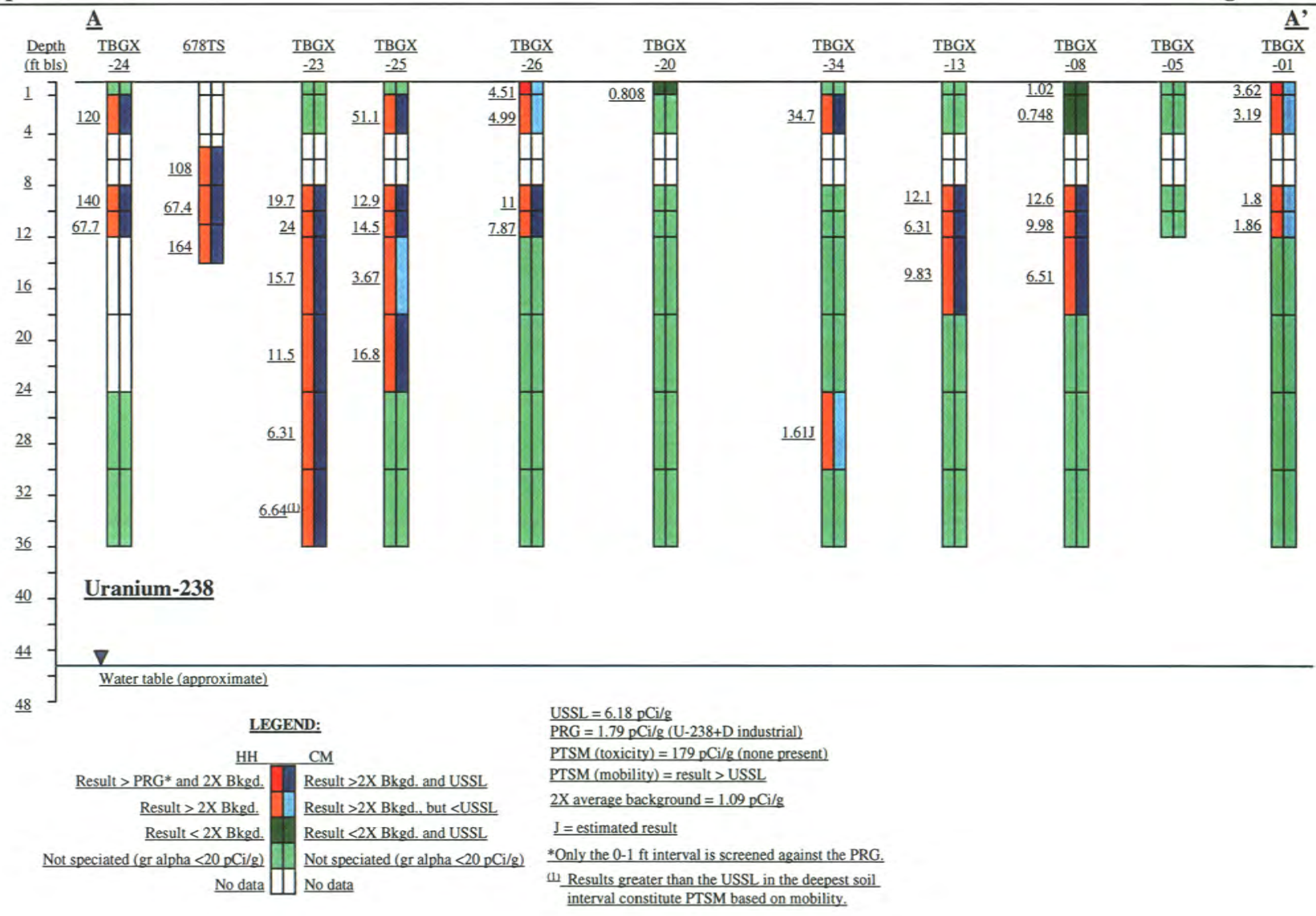


Figure 12. TBG Extent of Contamination – Uranium-238 in Cross-Section

(This page intentionally left blank)

Figure 13. T Area Cap Plan

(This page intentionally left blank)

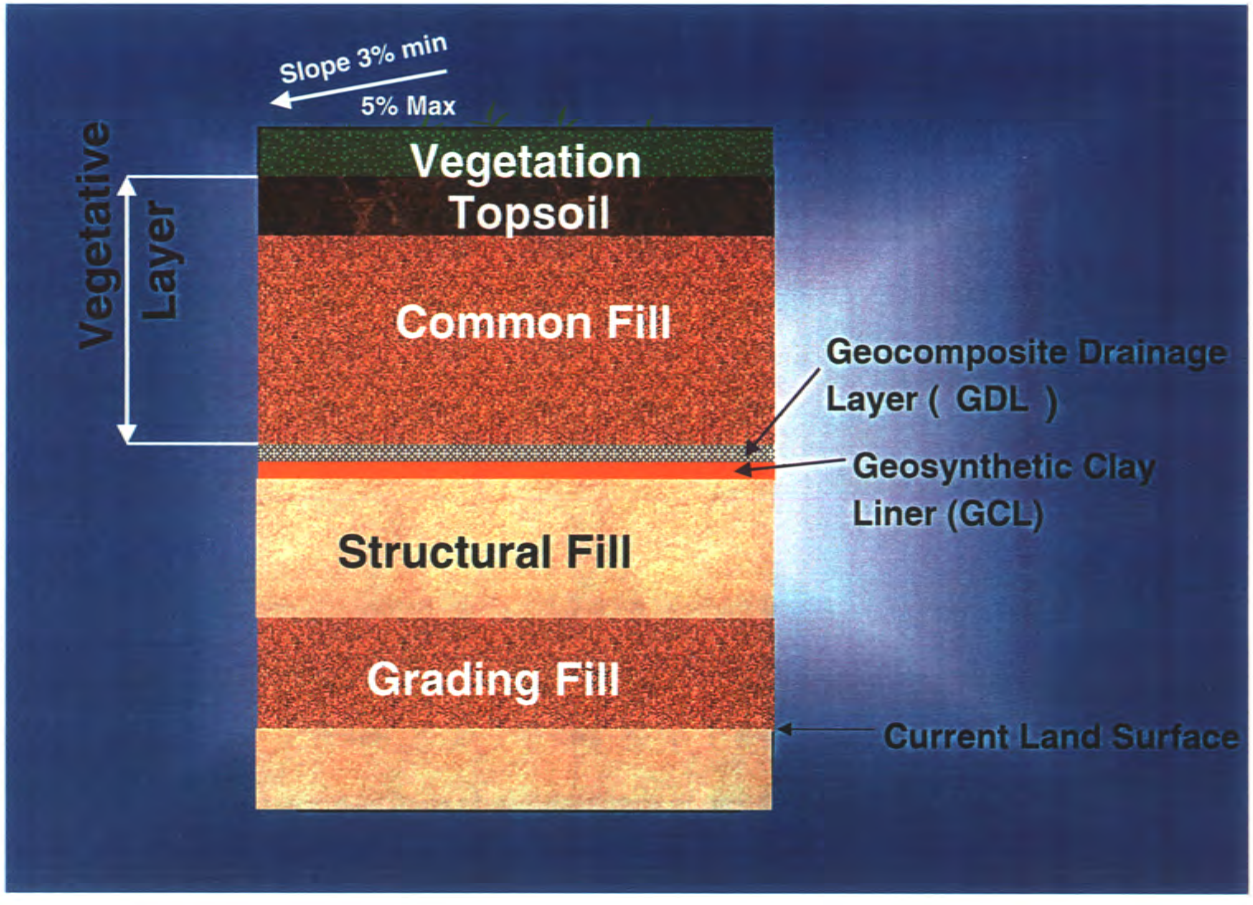


Figure 14. Schematic Illustration of the Cap.

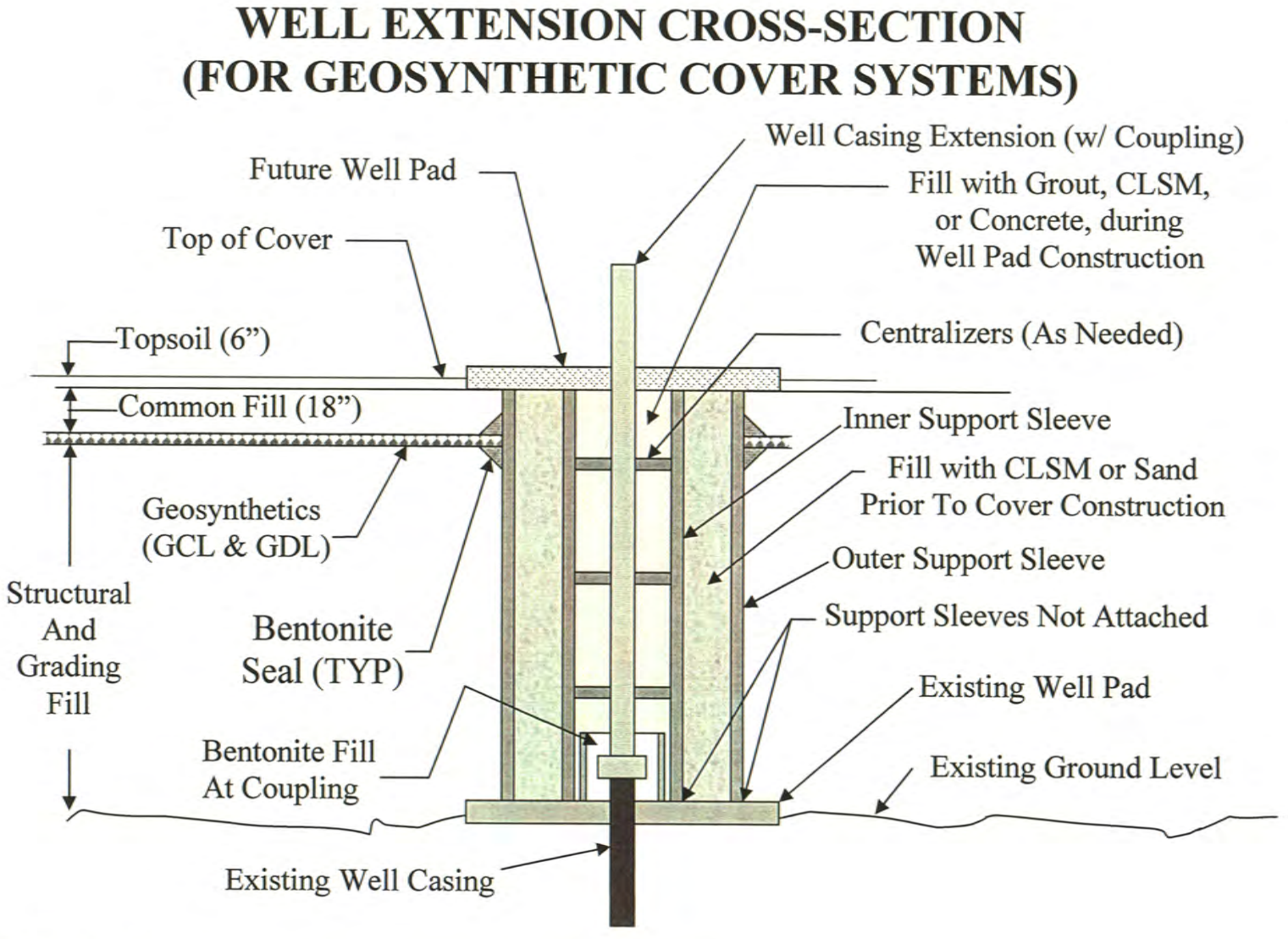


Figure 15. Well Extension Cross-Section (for Geosynthetic Cover Systems)

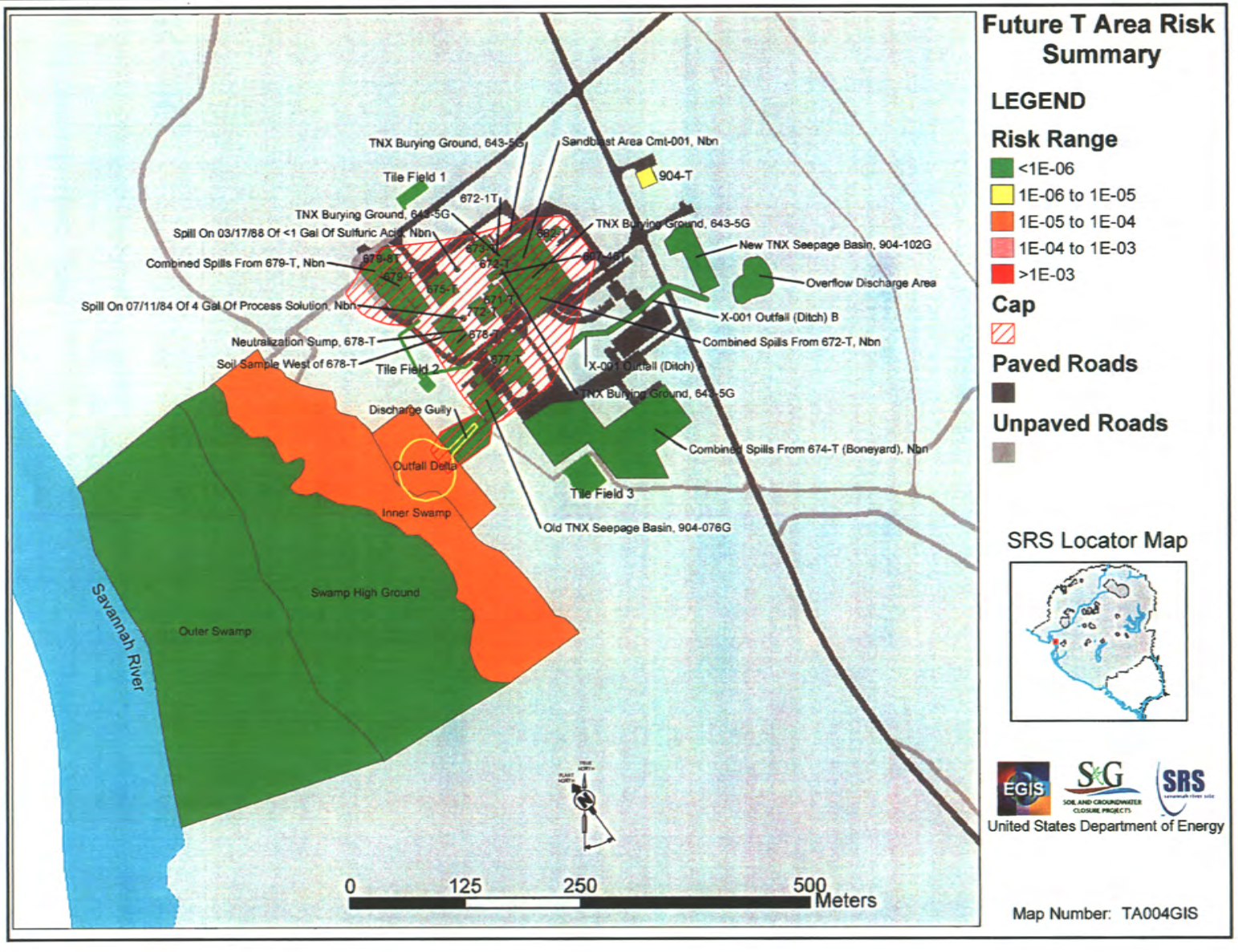


Figure 16. Future T Area Risk Summary

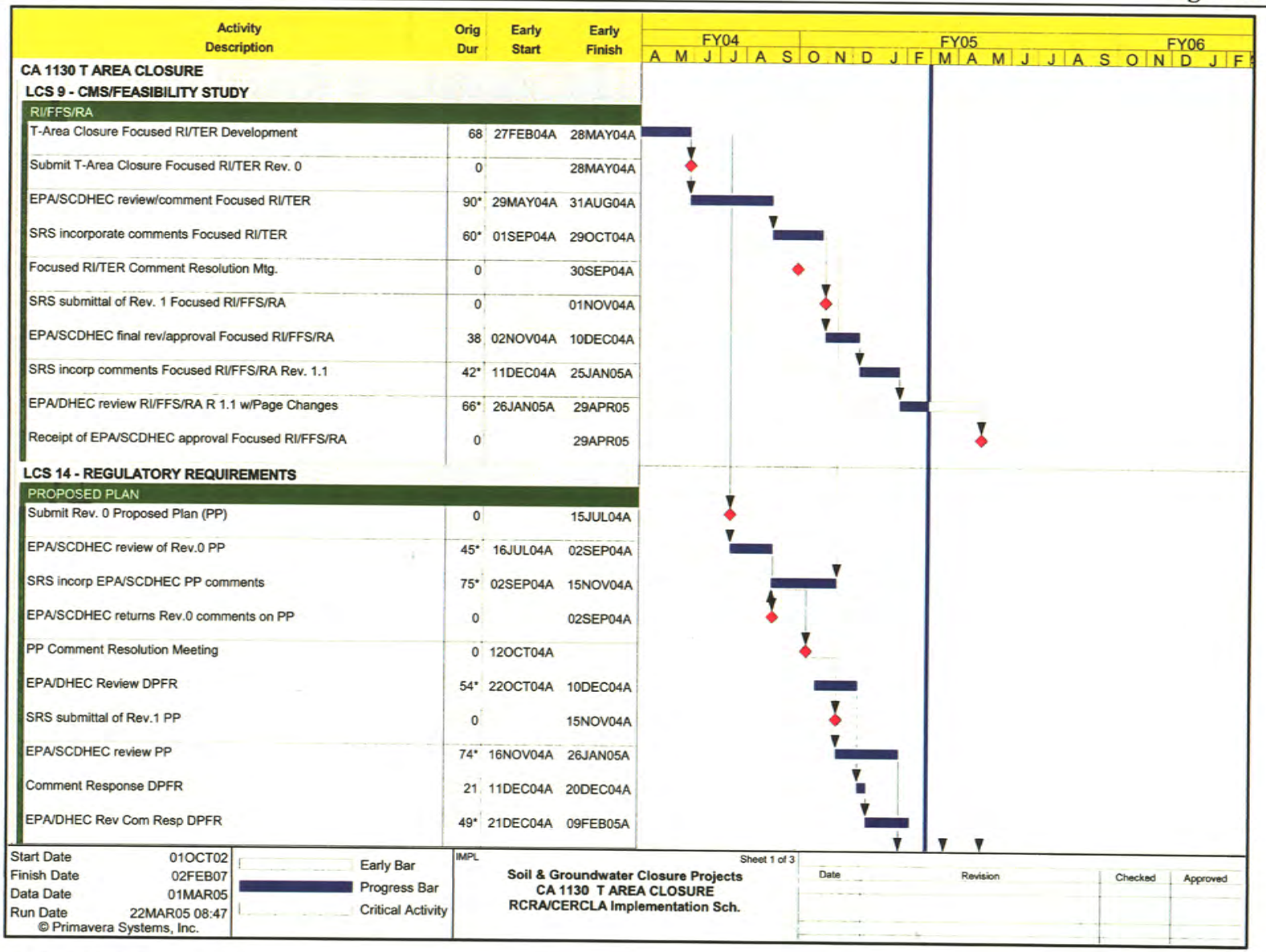
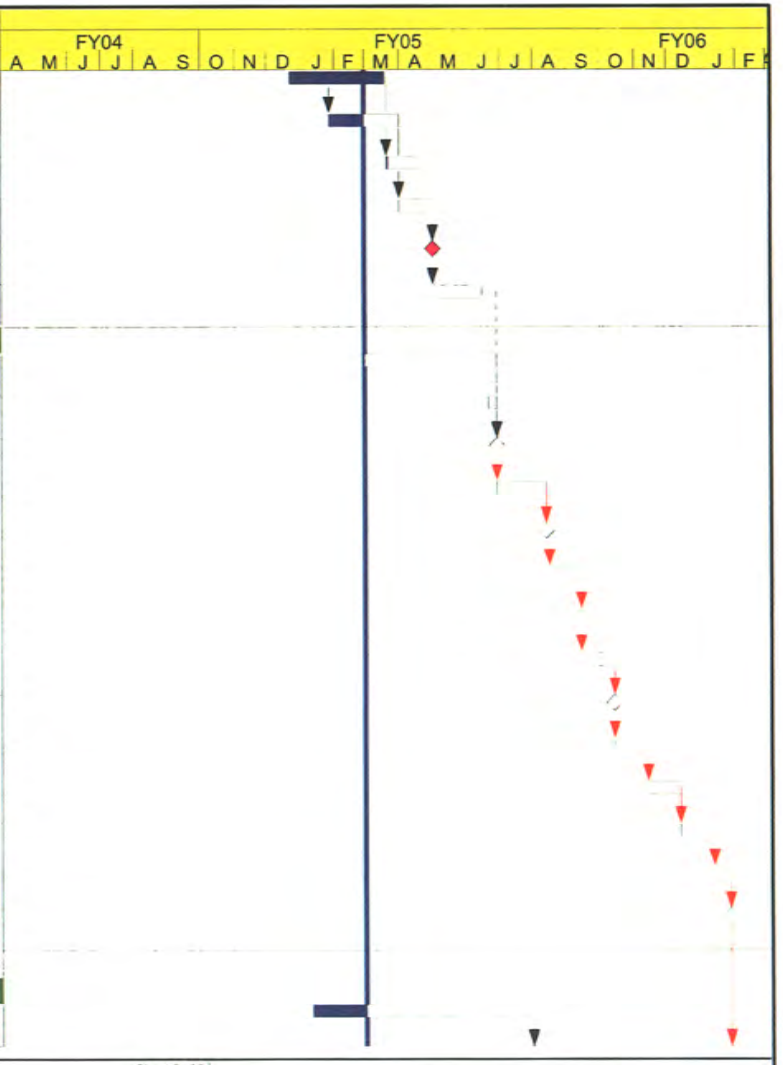


Figure 17. Schedule

Activity Description	Orig Dur	Early Start	Early Finish
Revise & Resubmit DPFR	90*	22DEC04A	18MAR05A
SRS respond to Rev. 1 PP comments	64*	27JAN05A	31MAR05
EPA/DHEC Approve DPFR	30	21MAR05A	20APR05
EPA/SCDHEC Approve Rev.1 PP comments	30	01APR05	30APR05
Receipt of EPA/SCDHEC approval PP	0		30APR05
Public Comment Period	14	01MAY05	14JUN05
RECORD OF DECISION			
Develop ROD	84*	01MAR05A	28JUN05
DOE-SR/DOE-HQ Approval Rev. 0 ROD	7	22JUN05	28JUN05
Submit Rev. 0 ROD	0		28JUN05*
EPA/SCDHEC review of Rev. 0 ROD	45	29JUN05	12AUG05
EPA/SCDHEC returns Rev. 0 comments for ROD	0		12AUG05
SRS incorporates EPA/SCDHEC comments ROD	21	15AUG05	13SEP05
SRS submittal of Rev.1 ROD	0		13SEP05
EPA/SCDHEC final review and approval of ROD	30	14SEP05	13OCT05
Receipt of ROD Approval	0		13OCT05
DOE obtain Signature on ROD	30	14OCT05	12NOV05
EPA obtain signature on ROD	30	13NOV05	12DEC05
SCDHEC obtain signature on ROD	30	13DEC05	11JAN06
Prepare Public Notice	14	12JAN06	25JAN06
Issue ROD (T Area Closure)	0		25JAN06
LCS 15 - DETAILED ENG & PRECONST ACTIVITIES			
POST ROD DOCUMENTS			
Develop Rev. 0 CAP CMI/RAIP (Post-Rod Document)	161	10JAN05A	29JUL05



Start Date 01OCT02
Finish Date 02FEB07
Data Date 01MAR05
Run Date 22MAR05 08:47
© Primavera Systems, Inc.

Early Bar
Progress Bar
Critical Activity

IMPL

Sheet 2 of 3

Soil & Groundwater Closure Projects
CA 1130 T AREA CLOSURE
RCRA/CERCLA Implementation Sch.

Date	Revision	Checked	Approved

Figure 17. Schedule (Continued)

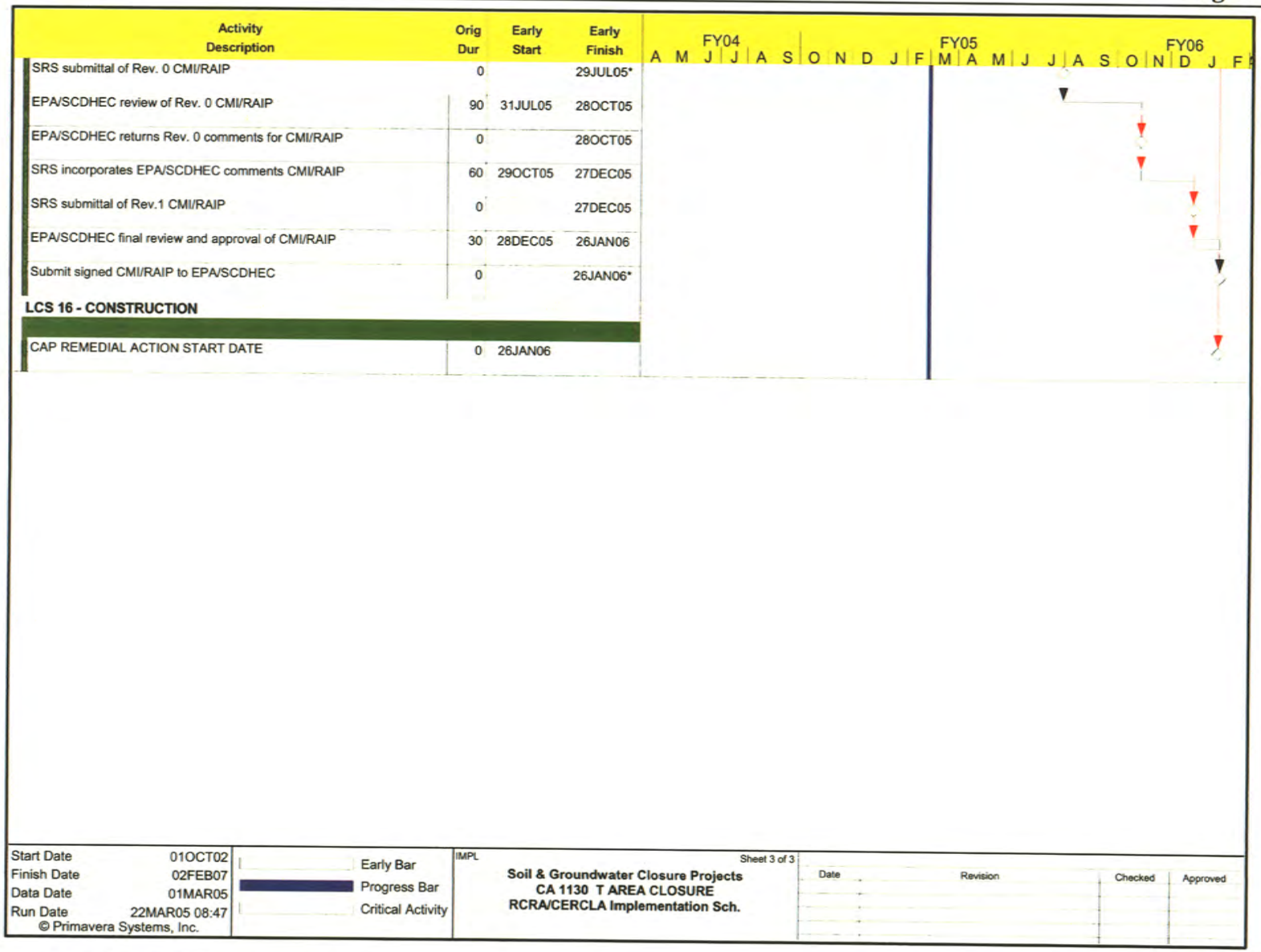


Figure 17. Schedule (Continued)

Table 1. Summary of the Remedial Strategy for T Area

Areas	Risk	Impacted Media	Media Addressed under Previous Document	Media Addressed Under This ROD[1]	Remedial or Removal Action Taken Under Other Documents	Other Documents
TNX Area OU						
NTSB/IPSL	ECO, HH	surface water, soil	•		Draining the Surface Water from the NTSB , Backfilling the NTSB, Grouting the IPSL, and Institutional Controls	TNX Area OU ROD (WSRC-RP-2003-4017)
TBG/Vadose Zone	CM, $PTSM^M$	soil	•		Soil Vapor Extraction	TNX Area OU ROD (WSRC-RP-2003-4017)
OTSB/IPSL	CM, $PTSM^T$	soil	•		Excavation and Offsite Disposal of PTSM from the OTSB/IPSL, Grouting the Unexcavated Portions of the IPSL, Backfilling the Excavations, Constructing an Engineered Cap, and Institutional Controls	TNX Area OU ROD (WSRC-RP-2003-4017)
DG	CM, HH	soil	•		Backfilling the DG, Constructing an Engineered Cap, and Institutional Controls	TNX Area OU ROD (WSRC-RP-2003-4017)
TNX Groundwater	HH	groundwater	•		Soil Vapor Extraction and Air Stripping (Pump-and-Treat)	TNX Area OU ROD (WSRC-RP-2003-4017)
677-T/678-T Suspect Sumps	$PTSM^T$	soil	•		Excavation and Offsite Disposal of PTSM from the 677-T and 678-T Suspect Sumps (includes Neutralization Sump 678-T)	Explanation of Significant Difference to the TNX Area OU ROD (WSRC-RP-2005-4030)
TNXOD OU						
Outfall Delta	CM, $PTSM^M$, HH	soil	•	•	Soil Removal and Placement in the Industrialized Portion of T Area, Soil Amendments in the Excavated Area, Backfilling, and Institutional Controls	RSER/EE/CA for the TNXOD OU (WSRC-RP-2004-4055)
Inner Swamp	CM, $PTSM^M$, HH	soil	•	•	Soil Removal and Placement in the Industrialized Portion of T Area, Soil Amendments in the Excavated Area, Backfilling, and Institutional Controls	RSER/EE/CA for the TNXOD OU (WSRC-RP-2004-4055)
Swamp High Ground	NONE	Soil		•	No problem warranting action[2]	RI/FFS/RA for TAOU (WSRC-RP-2004-4050)
Outer Swamp	NONE	Soil		•	No problem warranting action[2]	RI/FFS/RA for TAOU (WSRC-RP-2004-4050)

Table 1. Summary of the Remedial Strategy for T Area (Continued)

Areas	Risk	Impacted Media	Media Addressed under Previous Document	Media Addressed Under This ROD[1]	Remedial or Removal Action Taken Under Other Documents	Document
X-001 Outfall Drainage Ditch OU	ARAR, HH	soil	•	•	Soil Removal and Soil Placement in the Industrialized Portion of T Area and Institutional Controls No further action warranted[2] at unit after excavation because RAOs have been met.	RSER/EE/CA for the X-001 Outfall Drainage Ditch OU (WSRC-RP-2004-4018)
Tile Field #1	NONE	soil	•		No problem warranting action[2]	RI/FFS/RA for TAOU (WSRC-RP-2004-4050)
Tile Field #2	CM	soil	•	•	Soil Removal and Soil Placement in the Industrialized Portion of T Area and Institutional Controls No further action [2] warranted at unit after excavation because RAOs have been met.	RSER/EE/CA for the Tile Field #2 (WSRC-RP-2004-4027)
Tile Field #3	NONE	soil	•		No problem warranting action[2]	RI/FFS/RA for TAOU (WSRC-RP-2004-4050)
TNX Area Process Sewer Lines	NONE	soil	•		No problem warranting action[2]	RI/FFS/RA for TAOU (WSRC-RP-2004-4050)
TBG (Previously-Inaccessible Areas)	CM, PTSM^{M}, HH	soil		•	NONE	RI/FFS/RA for TAOU (WSRC-RP-2004-4050)
Former Building Slabs	HH	concrete	•	•	Removal of Buildings and Scabbling of Slabs to Remove PTSM and Institutional Controls	DPFRs, RI/FFS/RA for TAOU (WSRC-RP-2004-4050)
	PTSM^{T}	soil	•	•	None required.	RI/FFS/RA for TAOU (WSRC-RP-2004-4050)

[1] See Table 2 for proposed actions to be taken under this ROD.
[2] No problem warranting action or no further action warranted determinations are supported in the cited documents. These determinations are part of this ROD.
Note: The TAOU includes soil and associated materials (such as concrete and slabs); TNX groundwater is addressed under the TNX Area OU.
T= Toxicity
M = Mobility

Table 2. Summary of the Comprehensive Remedial Strategy for the TAOU

Areas	Risk	Impacted Media	Remedial Action to Be Taken Under the TAOU[1]	Document
X-001 Outfall Drainage Ditch OU	ARAR, HH	Stockpiled soils contaminated with PCBs and radionuclides	Disposition of Excavated Soil Removed Under the RSER/EE/CA	SB/PP for the TAOU
		Unit soils contaminated with PCBs and radionuclides	Construction of the Engineered Cap	
Tile Field #2	CM	Stockpiled soils contaminated with mercury	Disposition of Excavated Soil Removed Under the RSER/EE/CA	SB/PP for the TAOU
TBG (Previously-Inaccessible Areas) and Neutralization Sump 678-T	CM, PTSM[M], HH	Unit soils contaminated with mercury, PCE, and radionuclides.	Construction of the Engineered Cap	SB/PP for the TAOU
Outfall Delta and Inner Swamp	CM, PTSM[M], HH	Stockpiled soils contaminated with radionuclides.	Disposition of Excavated Soil Removed Under the RSER/EE/CA	SB/PP for the TAOU
		Unit soils contaminated with radionuclides.	Surface Broadcasting of Soil Amendments	
Former Building and Slabs	HH	Concrete contaminated with metals, radionuclides, and VOCs. Isolated areas of potential soil contamination, including residual soil contamination at Building 677-T and 678-T sumps.	Construction of the Engineered Cap	SB/PP for the TAOU

[1] All areas of the TAOU will have institutional controls.
T= Toxicity
M = Mobility

Table 3. Summary of Characterization Data for Former Buildings and Slabs

Former Building	Number of Measurements/ Invasive Samples	Parameters	Action Taken
607-46T Organic Removal Facility	98/0	Metals, Gross VOCs	Scabbled
671-T Tank Gallery	518/11	Metals, Gross VOCs	Scabbled
672-1T Cooling Tower	32/0	Metals, Gross VOCs	Scabbled
672-T DWPF Semi-Works, Building	Surface scan/40	Metals	Scabbled
673-T Containerization Equipment Development Facility	301/0	Metals, Gross VOCs	Scabbled
675-T Melter Demonstration and Multiple Process Facilities	498/12	Metals, Gross VOCs	Scabbled
677-T 677-T Pilot Plant Building	Surface survey/4 composite	Metals, Radionuclides	Scabbled
678-T Chemical Semiworks Building	0/88	Metals, Radionuclides	Scabbled
679-8T Fire Pump House	28/0	Metals, Gross VOCs	None
679-T Administrative and Laboratory Building	886/8	Metals, Gross VOCs	Scabbled
682-T Precipitate Hydrolysis Experimental Facility (PHEF)	87/2	Metals, Gross VOCs	Scabbled
772-T Analytical Laboratory	275/12	Metals, Gross VOCs	Scabbled
904-T Effluent Treatment Plant	216/0	Metals, Gross VOCs	Scabbled

Data are compiled from DPFR reports (WSRC 2005 b through y) and TAOU RI/FFS/RA (WSRC 2005a).

Table 4. Summary of Human Health Constituents of Concern and Medium-Specific Exposure Point Concentrations

TNX Outfall Delta

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil (0-1 ft)
TNX Outfall Delta

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Soil Onsite - Direct Contact	Actinium-228	0.201	48.8	pCi/g	11/11	48.8	pCi/g	MAX
	Lead-212	0.207	48.3	pCi/g	11/11	48.3	pCi/g	MAX
	Radium-228	0.302	41.2	pCi/g	11/11	41.2	pCi/g	MAX
	Thorium-228	0.309	43.8	pCi/g	11/11	43.8	pCi/g	MAX

Key
MAX: maximum concentration

TNX Inner Swamp

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Surface Sediment (0-1 ft)
TNX Inner Swamp

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Sediment Onsite - Direct Contact	Actinium-228	0.698	101	pCi/g	61/61	19.2	pCi/g	95% UCL
	Radium-228	0.811	106	pCi/g	61/61	19.1	pCi/g	95% UCL
	Thorium-228	0.833	79.7	pCi/g	56/56	17.7	pCi/g	95% UCL

Key
95% UCL: 95% Upper Confidence Limit

Table 4. Summary of Human Health Constituents of Concern and Medium-Specific Exposure Point Concentrations (Continued)

X-001 Outfall Drainage Ditch

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil (0-1 ft)
X-001 Outfall Drainage Ditch

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Soil Onsite - Direct Contact	Uranium-238	0.464	23.1	pCi/g	7/8	23.1	pCi/g	MAX

Key
MAX: maximum concentration

TNX Burying Ground- Previously Inaccessible Areas

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil (0-1 ft)
TNX Burying Ground- Previously Inaccessible Areas

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Soil Onsite - Direct Contact	Uranium-238	0.491	4.51	pCi/g	9/9	3.76	pCi/g	95% UCL

Key
95% UCL: 95% Upper Confidence Limit

Table 4. Summary of Human Health Constituents of Concern and Medium-Specific Exposure Point Concentrations (Continued)

Former Buildings and Slabs 672-T

Scenario Timeframe: Current/Future
Medium: Concrete
Exposure Medium: Surface Concrete
Former Buildings and Slabs 672-T

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Concrete Onsite - Direct Contact	Arsenic	2.3	4.65	mg/kg	8/8	4.65	mg/kg	MAX

Key
MAX: maximum concentration

Former Buildings and Slabs 677-T

Scenario Timeframe: Current/Future
Medium: Concrete
Exposure Medium: Surface Concrete
Former Buildings and Slabs 677-T

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Concrete Onsite - Direct Contact	Arsenic	1.05	9.19	mg/kg	12/12	9.19	mg/kg	MAX
	Uranium-235	0.003	1.13	pCi/g	10/10	1.13	pCi/g	MAX
	Uranium-238	0.222	86.9	pCi/g	10/10	86.9	pCi/g	MAX

Key
MAX: maximum concentration

Table 4. Summary of Human Health Constituents of Concern and Medium-Specific Exposure Point Concentrations (Continued)

Former Buildings and Slabs 678-T

Scenario Timeframe: Current/Future
Medium: Concrete
Exposure Medium: Surface Concrete
Former Buildings and Slabs 678-T

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Concrete Onsite - Direct Contact	Arsenic	1.25	13	mg/kg	19/30	13	mg/kg	MAX
	Chromium	10.8	1600	mg/kg	30/30	1600	mg/kg	MAX
	Radium-228	0.81	74.3	pCi/g	8/19	74.3	pCi/g	MAX
	Thorium-228	0.81	74.3	pCi/g	8/19	74.3	pCi/g	MAX
	Thorium-232	0.81	74.3	pCi/g	8/19	74.3	pCi/g	MAX
	Uranium-235	0.53	8.59	pCi/g	6/19	8.59	pCi/g	MAX
	Uranium-238	96.25	261	pCi/g	5/19	261	pCi/g	MAX

Key
MAX: maximum concentration

Former Buildings and Slabs 671-T

Scenario Timeframe: Current/Future
Medium: Concrete
Exposure Medium: Surface Concrete
Former Buildings and Slabs 671-T

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Concrete Onsite - Direct Contact	Chromium	680	900	mg/kg	4/8	900	mg/kg	MAX

Key
MAX: maximum concentration

Table 4. Summary of Human Health Constituents of Concern and Medium-Specific Exposure Point Concentrations (Continued)

Former Buildings and Slabs 679-T

Scenario Timeframe: Current/Future
Medium: Concrete
Exposure Medium: Surface Concrete
Former Buildings and Slabs 679-T

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Concrete Onsite - Direct Contact	Chromium	500	920	mg/kg	11/12	920	mg/kg	MAX

Key
MAX: maximum concentration

Former Buildings and Slabs 682-T

Scenario Timeframe: Current/Future
Medium: Concrete
Exposure Medium: Surface Concrete
Former Buildings and Slabs 682-T

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Concrete Onsite - Direct Contact	Chromium	1000	1000	mg/kg	1/1	1000	mg/kg	MAX
	Benzene	2.1	2.1	mg/kg	1/1	2.1	mg/kg	MAX

Key
MAX: maximum concentration

Table 4. Summary of Human Health Constituents of Concern and Medium-Specific Exposure Point Concentrations (Continued)

Former Buildings and Slabs 772-T

Scenario Timeframe: Current/Future
Medium: Concrete
Exposure Medium: Surface Concrete
Former Buildings and Slabs 772-T

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Concrete Onsite - Direct Contact	Chromium	600	760	mg/kg	3/4	760	mg/kg	MAX

Key
MAX: maximum concentration

Former Buildings and Slabs 607-46T

Scenario Timeframe: Current/Future
Medium: Concrete
Exposure Medium: Surface Concrete
Former Buildings and Slabs 607-46T

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Concrete Onsite - Direct Contact	Chromium	850	850	mg/kg	1/1	850	mg/kg	MAX

Key
MAX: maximum concentration

Table 4. Summary of Human Health Constituents of Concern and Medium-Specific Exposure Point Concentrations (Continued)

Former Buildings and Slabs 904-T

Scenario Timeframe: Current/Future
Medium: Concrete
Exposure Medium: Surface Concrete
Former Buildings and Slabs 904-T

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Concrete Onsite - Direct Contact	Chromium	540	540	mg/kg	1/4	540	mg/kg	MAX

Key
MAX: maximum concentration

Table 5. Cancer Toxicity Data Summary

Toxicity Data Used in the RFI/RI with BRA for the TNX OD OU (WSRC 2002a)

Pathway: Ingestion, Dermal

Constituent of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (Year)
Actinium-228	1.62E-12	NA	Risk/pCi	A	HEAST	1995
Lead-212	1.80E-11	NA	Risk/pCi	A	HEAST	1995
Radium-228	2.48E-10	NA	Risk/pCi	A	HEAST	1995
Thorium-228	2.31E-10	NA	Risk/pCi	A	HEAST	1995
Thorium-234	1.93E-11	NA	Risk/pCi	A	HEAST	1995
Uranium-233/234	4.48E-11	NA	Risk/pCi	A	HEAST	1995
Uranium-235	4.70E-11	NA	Risk/pCi	A	HEAST	1995
Uranium-238	6.20E-11	NA	Risk/pCi	A	HEAST	1995

Pathway: Inhalation

Constituent of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (Year)
Actinium-228	NA	NA	3.27E-11	Risk/pCi	A	HEAST	1995
Lead-212	NA	NA	3.85E-11	Risk/pCi	A	HEAST	1995
Radium-228	NA	NA	9.94E-10	Risk/pCi	A	HEAST	1995
Thorium-228	NA	NA	9.68E-08	Risk/pCi	A	HEAST	1995
Thorium-234	NA	NA	1.90E-11	Risk/pCi	A	HEAST	1995
Uranium-233/234	NA	NA	1.41E-08	Risk/pCi	A	HEAST	1995
Uranium-235	NA	NA	1.30E-08	Risk/pCi	A	HEAST	1995
Uranium-238	NA	NA	1.24E-08	Risk/pCi	A	HEAST	1995

Pathway: External (Radiation)

Constituent of Concern	Cancer Slope or Conversion Factor	Exposure Route	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (Year)
Actinium-228	3.28E-06	External exposure	g/y-pCi	A	HEAST	1995
Lead-212	3.00E-07	External exposure	g/y-pCi	A	HEAST	1995
Radium-228	3.28E-06	External exposure	g/y-pCi	A	HEAST	1995
Thorium-228	6.20E-06	External exposure	g/y-pCi	A	HEAST	1995
Thorium-234	3.50E-09	External exposure	g/y-pCi	A	HEAST	1995
Uranium-233/234	3.52E-11	External exposure	g/y-pCi	A	HEAST	1995
Uranium-235	2.65E-07	External exposure	g/y-pCi	A	HEAST	1995
Uranium-238	6.57E-08	External exposure	g/y-pCi	A	HEAST	1995

Key
HEAST: Health Effects Summary Table USEPA
A: Human carcinogen
NA: Not available

Table 5. Cancer Toxicity Data Summary (Continued)

Toxicity Data Used in the Streamlined Risk Evaluations

Pathway: Ingestion, Dermal

Constituent of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (Year)
Radium-228 (+D)	6.70E-10	NA	Risk/pCi	A	HEAST	2003
Thorium-228 (+D)	1.62E-10	NA	Risk/pCi	A	HEAST	2003
Thorium-232	8.47E-11	NA	Risk/pCi	A	HEAST	2003
Uranium-235 (+D)	5.03E-11	NA	Risk/pCi	A	HEAST	2003
Uranium-238 (+D)	5.62E-11	NA	Risk/pCi	A	HEAST	2003
Arsenic	1.5E+00	none[1]	1/(mg/kg-d)	A	IRIS	2002
Chromium	none	none[1]	1/(mg/kg-d)	A	IRIS	2002
Benzene	5.5E-02	none[1]	1/(mg/kg-d)	A	IRIS	2002

Pathway: Inhalation

Constituent of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (Year)
Radium-228 (+D)	NA	NA	5.23E-09	Risk/pCi	A	HEAST	2003
Thorium-228 (+D)	NA	NA	1.43E-07	Risk/pCi	A	HEAST	2003
Thorium-232	NA	NA	4.33E-08	Risk/pCi	A	HEAST	2003
Uranium-235 (+D)	NA	NA	1.01E-08	Risk/pCi	A	HEAST	2003
Uranium-238 (+D)	NA	NA	9.35E-09	Risk/pCi	A	HEAST	2003
Arsenic	NA	NA	1.5E+01	1/(mg/kg-d)	A	IRIS	2002
Chromium	NA	NA	4.2E+01	1/(mg/kg-d)	A	IRIS	2002
Benzene	NA	NA	2.9E-02	1/(mg/kg-d)	A	IRIS	2002

Pathway: External (Radiation)

Constituent of Concern	Cancer Slope or Conversion Factor	Exposure Route	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (Year)
Radium-228 (+D)	4.53E-06	External exposure	Risk/yr per pCi/g	A	HEAST	2003
Thorium-228 (+D)	7.76E-06	External exposure	Risk/yr per pCi/g	A	HEAST	2003
Thorium-232	3.42E-10	External exposure	Risk/yr per pCi/g	A	HEAST	2003
Uranium-235 (+D)	5.43E-07	External exposure	Risk/yr per pCi/g	A	HEAST	2003
Uranium-238 (+D)	1.14E-07	External exposure	Risk/yr per pCi/g	A	HEAST	2003

Key
HEAST: Health Effects Summary Table USEPA; values used in the USEPA Radcalculator website http://epa-prgs.ornl.gov/radionuclides
IRIS: Integrated Risk Information System USEPA; values used in the USEPA Region IX website www.epa.gov/region09/waste/sfund/prg/index.htm
A: Human carcinogen
1: Dermal cancer slope factors obtained by using the oral cancer slope factor and applying an oral-to-dermal adjustment factor.
Radiological PRGs are industrial worker soil values from *Radionuclide Preliminary Remediation Goals,* Engineering Calculation K-CLC-G-00077, Rev. 1 Westinghouse Savannah River Company, (July, 2003). PRG for Ra-228 (+D) = 1.49E-01 pCi/g; Th-228(+D) = 2.52E-01 pCi/g; Th-232 = 2.02E+01 pCi/g; U-235 (+D) = 3.94E-01 pCi/g; U-238(+D) = 1.79E+00 pCi/g.

Nonradiological PRGs are industrial worker soil values from the USEPA Region IX Preliminary Remediation Goals Table, United States Environmental Protection Agency, San Francisco, CA (October, 2002). PRG for As = 1.59E+00 mg/kg; Cr = 4.48E+02 mg/kg, benzene= 1.31E+00 mg/kg.

Table 6. Risk Characterization Summary - Carcinogens

TNX Outfall Delta

Scenario Timeframe: Future
Receptor Population: Recreational Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil	Surface Soil, Dust	Soil Onsite-Direct Contact, Inhalation of Soil as Dust	Actinium-228	3.95E-09	2.86E-13	NA	1.46E-05	1.46E-05
			Lead-212	4.35E-08	3.33E-13	NA	1.32E-06	1.36E-06
			Radium-228	5.11E-07	7.34E-12	NA	1.23E-05	1.28E-05
			Thorium-228	5.06E-07	7.60E-10	NA	2.48E-05	2.53E-05
							Soil Risk Total =	5.41E-05

Key
NA: Not applicable

NOTE: This table presents the results of the formal baseline risk assessment presented in the *RFI/RI with BRA for the TNX Outfall Delta, Lower Discharge Gully and Swamp Operable Unit* (WSRC 2002a) using Phase 1 and Phase 2 data. A subsequent evaluation, documented in the *RSER EE/CA for the TNXOD OU* (WSRC 2004a) combines the Outfall Delta and Inner Swamp exposure groups and considers selected data points from the Phase 1, Phase 2 and Phase 3 samples to obtain a maximum risk estimate for Th-228. The Th-228 soil/sediment maximum risk estimate based on this evaluation is 8E-05.

TNX Inner Swamp

Scenario Timeframe: Future
Receptor Population: Recreational Trespasser
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Sediment	Surface Sediment	Sediment Onsite-Direct Contact	Actinium-228	1.56E-09	NA	NA	5.75E-06	5.75E-06
			Radium-228	2.37E-07	NA	NA	5.72E-06	5.96E-06
			Thorium-228	2.04E-07	NA	NA	1.00E-05	1.02E-05
							Sediment Risk Total =	2.19E-05

Key
NA: Not applicable

NOTE: This table presents the results of the formal baseline risk assessment presented in the *RFI/RI with BRA for the TNX Outfall Delta, Lower Discharge Gully and Swamp Operable Unit* (WSRC 2002a) using Phase 1 and Phase 2 data. A subsequent evaluation, documented in the *RSER EE/CA for the TNXOD OU* (WSRC 2004a) combines the Outfall Delta and Inner Swamp exposure groups and considers selected data points from the Phase 1, Phase 2 and Phase 3 samples to obtain a maximum risk estimate for Th-228. The Th-228 soil/sediment maximum risk estimate based on this evaluation is 8E-05.

Table 6. Risk Characterization Summary - Carcinogens (Continued)

X-001 Outfall Drainage Ditch

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil	Surface Soil, Dust	Soil Onsite-Direct Contact, Inhalation of Soil as Dust	Uranium-238	NC	NC	NA	NC	1.29E-05
							Soil Risk Total =	1.29E-05

Key
NA: Not applicable
NC: Not calculated. Risk was not calculated separately for each exposure pathway. Instead, the PRG value that was used to estimate risk is a risk based concentration that is derived from standardized equations and combines all of the exposure pathways and assumptions with USEPA toxicity data. Use of the PRG provides an exposure routes total risk estimate.

TNX Burying Ground - Previously Inaccessible Areas

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil	Surface Soil, Dust	Soil Onsite-Direct Contact, Inhalation of Soil as Dust	Uranium-238	NC	NC	NA	NC	2.10E-06
							Soil Risk Total =	2.10E-06

Key
NA: Not applicable
NC: Not calculated. Risk was not calculated separately for each exposure pathway. Instead, the PRG value that was used to estimate risk is a risk based concentration that is derived from standardized equations and combines all of the exposure pathways and assumptions with USEPA toxicity data. Use of the PRG provides an exposure routes total risk estimate.

Table 6. Risk Characterization Summary - Carcinogens (Continued)

Former Buildings and Slabs 672-T

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Concrete	Concrete, Dust	Concrete Onsite-Direct Contact, Inhalation of Concrete as Dust	Arsenic	NC	NC	NC	NA	2.92E-06
							Concrete Risk Total =	2.92E-06

Key
NA: Not applicable
NC: Not calculated. Risk was not calculated separately for each exposure pathway. Instead, the PRG value that was used to estimate risk is a risk based concentration that is derived from standardized equations and combines all of the exposure pathways and assumptions with USEPA toxicity data. Use of the PRG provides an exposure routes total risk estimate.

Former Buildings and Slabs 677-T

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Concrete	Concrete, Dust	Concrete Onsite-Direct Contact, Inhalation of Concrete as Dust	Uranium-235	NC	NC	NA	NC	2.87E-06
			Uranium-238	NC	NC	NA	NC	4.85E-05
			Arsenic	NC	NC	NC	NA	5.78E-06
							Concrete Risk Total =	5.72E-05

Key
NA: Not applicable
NC: Not calculated. Risk was not calculated separately for each exposure pathway. Instead, the PRG value that was used to estimate risk is a risk based concentration that is derived from standardized equations and combines all of the exposure pathways and assumptions with USEPA toxicity data. Use of the PRG provides an exposure routes total risk estimate.

Table 6. Risk Characterization Summary - Carcinogens (Continued)

Former Buildings and Slabs 678-T

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Concrete	Concrete, Dust	Concrete Onsite-Direct Contact, Inhalation of Concrete as Dust	Radium-228	NC	NC	NA	NC	4.99E-04
			Thorium-228	NC	NC	NA	NC	2.95E-04
			Thorium-232	NC	NC	NA	NC	3.68E-06
			Uranium-235	NC	NC	NA	NC	2.18E-05
			Uranium-238	NC	NC	NA	NC	1.46E-04
			Arsenic	NC	NC	NC	NA	8.18E-06
			Chromium	NC	NC	NC	NA	3.57E-06
							Concrete Risk Total =	9.77E-04

Key
NA: Not applicable
NC: Not calculated. Risk was not calculated separately for each exposure pathway. Instead, the PRG value that was used to estimate risk is a risk based concentration that is derived from standardized equations and combines all of the exposure pathways and assumptions with EPA toxicity data. Use of the PRG provides an exposure routes total risk estimate.

Former Buildings and Slabs 671-T

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Concrete	Concrete, Dust	Concrete Onsite-Direct Contact, Inhalation of Concrete as Dust	Chromium	NC	NC	NC	NA	2.01E-06
							Concrete Risk Total =	2.01E-06

Key
NA: Not applicable
NC: Not calculated. Risk was not calculated separately for each exposure pathway. Instead, the PRG value that was used to estimate risk is a risk based concentration that is derived from standardized equations and combines all of the exposure pathways and assumptions with USEPA toxicity data. Use of the PRG provides an exposure routes total risk estimate.

Table 6. Risk Characterization Summary - Carcinogens (Continued)

Former Buildings and Slabs 679-T

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Concrete	Concrete, Dust	Concrete Onsite-Direct Contact, Inhalation of Concrete as Dust	Chromium	NC	NC	NC	NA	2.05E-06
							Concrete Risk Total =	2.05E-06

Key
NA: Not applicable
NC: Not calculated. Risk was not calculated separately for each exposure pathway. Instead, the PRG value that was used to estimate risk is a risk based concentration that is derived from standardized equations and combines all of the exposure pathways and assumptions with USEPA toxicity data. Use of the PRG provides an exposure routes total risk estimate.

Former Buildings and Slabs 682-T

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Concrete	Concrete, Dust	Concrete Onsite-Direct Contact, Inhalation of Concrete as Dust	Chromium	NC	NC	NC	NA	2.23E-06
			Benzene	NC	NC	NC	NA	1.60E-06
							Concrete Risk Total =	3.83E-06

Key
NA: Not applicable
NC: Not calculated. Risk was not calculated separately for each exposure pathway. Instead, the PRG value that was used to estimate risk is a risk based concentration that is derived from standardized equations and combines all of the exposure pathways and assumptions with USEPA toxicity data. Use of the PRG provides an exposure routes total risk estimate.

Table 6. Risk Characterization Summary - Carcinogens (Continued)

Former Buildings and Slabs 772-T

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Concrete	Concrete, Dust	Concrete Onsite-Direct Contact, Inhalation of Concrete as Dust	Chromium	NC	NC	NC	NA	1.70E-06
							Concrete Risk Total =	1.70E-06

Key
NA: Not applicable
NC: Not calculated. Risk was not calculated separately for each exposure pathway. Instead, the PRG value that was used to estimate risk is a risk based concentration that is derived from standardized equations and combines all of the exposure pathways and assumptions with USEPA toxicity data. Use of the PRG provides an exposure routes total risk estimate.

Former Buildings and Slabs 607-46T

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Concrete	Concrete, Dust	Concrete Onsite-Direct Contact, Inhalation of Concrete as Dust	Chromium	NC	NC	NC	NA	1.90E-06
							Concrete Risk Total =	1.90E-06

Key
NA: Not applicable
NC: Not calculated. Risk was not calculated separately for each exposure pathway. Instead, the PRG value that was used to estimate risk is a risk based concentration that is derived from standardized equations and combines all of the exposure pathways and assumptions with USEPA toxicity data. Use of the PRG provides an exposure routes total risk estimate.

Table 6. Risk Characterization Summary - Carcinogens (Continued)

Former Buildings and Slabs 904-T

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Concrete	Concrete, Dust	Concrete Onsite-Direct Contact, Inhalation of Concrete as Dust	Chromium	NC	NC	NC	NA	1.21E-06
							Concrete Risk Total =	1.21E-06

Key
NA: Not applicable
NC: Not calculated. Risk was not calculated separately for each exposure pathway. Instead, the PRG value that was used to estimate risk is a risk based concentration that is derived from standardized equations and combines all of the exposure pathways and assumptions with USEPA toxicity data. Use of the PRG provides an exposure routes total risk estimate.

Table 7. Remedial Goals for TAOU

Refined Constituent of Concerns (RCOCs)	Units	Type of Constituent of Concern (COC)	Remedial Goal (RG)
Outfall Delta (Soil)			
Actinium-228	pCi/g	HH	3.34
Lead-212	pCi/g	HH	35.34
Radium-228	pCi/g	HH	3.21
Thorium-228	pCi/g	HH	1.73
Uranium-233/234	pCi/g	CM	6.54
Uranium-235	pCi/g	CM	0.31
Uranium-238	pCi/g	CM	6.58
Inner Swamp (Sediment)			
Actinium-228	pCi/g	HH	3.34
Radium-228	pCi/g	HH	3.21
Thorium-228	pCi/g	HH	1.73
Uranium-233/234	pCi/g	CM	5.75
Uranium-235	pCi/g	CM	0.27
Uranium-238	pCi/g	CM	5.75
TNX Burying Ground (TBG) (Previously Inaccessible Areas) (Soil)			
Uranium-238	pCi/g	CM, HH	1.79
Stockpiled Soils from X-001 Outfall (Soil)			
PCB-1260	mg/kg	ARAR	10
Uranium-238	pCi/g	HH	1.79
Stockpiled Soils from Tile Field #2			
Mercury	mg/kg	CM	0.078

It should be noted that the disposition of soil under the cap is based upon ARARs, PTSM determinations, and contaminant migration considerations.

(This page intentionally left blank)

Table 8. Potential ARARs and To Be Considered (TBCs) for T Area

Regulation or Citation	Status	Synopsis of Regulation or Citation	Reason for Inclusion	Applicable Alternatives
Action-Specific				
Stormwater Management and Sediment Reduction 40 CFR 130 SC R.72-300 through 316, SC R.72-405 through 445	Applicable	Stormwater management and sediment control plan for land disturbances.	Excavation activities and construction/remedial action may require an erosion control plan.	2, 3
Water Pollution Control Permits Section 122 SC R.61-9.122 40 CFR 122-125	Applicable	Discharge of treated groundwater to stream must comply with the effluent limitation of the National Pollution Discharge Elimination System (NPDES) permit.	Applicable to point source discharges to surface waters including effluent water from extraction and treatment systems. Backfilling activities must avoid, minimize, and then mitigate any adverse effects on surface waters and wetlands. Potentially applicable if stormwater is discharged during construction activities.	2, 3
Well Construction Standards SC R.61-71	Applicable	Specifies requirements for well construction, operation, and abandonment.	Would apply if monitoring wells are installed, modified, or abandoned. Groundwater wells must be installed/abandoned and drilling wastes disposed in a manner to prevent cross-contamination of aquifers.	2, 3
Control of Fugitive Particulate Matter SC R.61-62.6 40 CFR 50.6	Applicable	Particulate matter must be controlled in such a manner and to the degree that it does not create an undesirable level of air pollution.	Earth-moving activities have the potential to generate airborne particulate matter. Measures may be required for dust suppression.	2, 3
Solid Waste Management SC R.61-107	Applicable	Regulations governing disposal of non-hazardous waste.	Implementation of certain alternatives will generate solid waste requiring disposal.	2, 3
Toxic Substances Control Act 40 CFR 761	Applicable	Identified cleanup levels and disposal requirements for PCBs and material containing PCBs.	Would be applicable if PCB remediation waste is generated.	2, 3

Table 8. Potential ARARs and TBCs for T Area (Continued)

Regulation or Citation	Status	Synopsis of Regulation or Citation	Reason for Inclusion	Applicable Alternatives
Identification and Listing of Hazardous Waste 40 CFR 261 Hazardous Waste Management System SC R.61-79.261	Applicable	Defines criteria for determining whether a waste is RCRA hazardous waste. Any waste media that are actively managed or shipped offsite must be tested to determine if they are RCRA characteristic wastes.	Would be applicable if hazardous waste is generated. Applicable for the management and transportation of RCRA hazardous waste and contaminated soils.	2, 3
Standards Applicable to Transporters of Hazardous Waste 40 CFR 263 SC R.61-79.263	Applicable	Identifies transporter requirements including manifests, record keeping, and actions for accidental waste discharges.	Would be applicable if hazardous waste is generated. Applicable to off-site transportation of RCRA hazardous waste.	2, 3
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, or Disposal Facilities 40 CFR 264	Applicable	General performance standards for facilities that treat, store, or dispose of hazardous waste.	Would be applicable if hazardous waste is generated. Applicable to off-site treatment, storage, or disposal of hazardous wastes.	2, 3
Land Disposal Restrictions (LDRs) 40 CFR 268	Applicable	Prohibits land disposal and specifies treatment standards for specific RCRA hazardous wastes. Movement of excavated materials from their original location triggers the RCRA LDRs.	Would be applicable if hazardous waste is generated. Applicable to excavation of wastes.	2, 3
National Emission Standards for Emissions of Radionuclides Other Than Radon From DOE Facilities Clean Air Act, Section 112, Subpart H National Emissions Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 61.90-61.97	Potentially Applicable	Identifies annual effective radiation dose limits for the public from USDOE activities at a particular site.	Applicable during soil handling activities.	2, 3
Standards for Protection Against Radiation 10 CFR 835 SC R.61-63.3	Applicable	Occupational radiation dose limits and monitoring requirements.	Soil is contaminated with radionuclides and worker dose limits are regulated.	1, 2, 3

Table 8. Potential ARARs and TBCs for T Area (Continued)

Regulation or Citation	Status	Synopsis of Regulation or Citation	Reason for Inclusion	Applicable Alternatives
USDOE Order 5400.5	TBC	Standards for exposure to the public of radiation from USDOE activities.	Soil is contaminated with radionuclides. Workers are considered to be the general public, and not radiation workers.	1, 2, 3
Transportation of Radioactive Waste into or within South Carolina 10 CFR 71 and SC R.61-83	Applicable	Standards for the transport of radioactive waste.	Soil contaminated with radioactive material may be excavated and transported to a licensed disposal facility.	2, 3
49 CFR 171 SC R.61-83	TBC	Transport regulations for hazardous materials.	Radioactive materials may be packaged and transported off-SRS for disposal.	2, 3
USDOE Order 5480.3	TBC	Requirements for shipping hazardous materials, substances, and waste.	Radioactive materials may be packaged and transported off-SRS for disposal.	2, 3
USDOE Order 435.1	TBC	Ensures that all USDOE radioactive waste is managed in a manner that is protective of worker and public health and safety, and the environment.	Soil is contaminated with radionuclides and excavation is possible. Dose limits are regulated. Transport of contaminated soil is possible.	2, 3
Occupational Safety and Health Act 29 CFR 1910 SC R.71-600	TBC	Safety standards for general industry.	Some activities at the unit, such as office work and sampling, would be defined as general industry.	1, 2, 3
Occupational Safety and Health Act 29 CFR 1926 SC R.71-700	TBC	Safety standards for construction.	General construction activities may be a part of the remedy.	2, 3
USDOE Order 5484	TBC	Safety standards for remediation workers.	The project will be a remedial action of a waste unit contaminated with solid waste.	2, 3
Fish and Wildlife Coordination Act 16 USC 661 *et seq.*	Applicable	Protection of fish and wildlife	Construction/remedial activities must protect wildlife.	2, 3
16 USC 1531	Applicable	Conservation of endangered or threatened species.	Sensitive habitat is present in the area.	1, 2, 3
16 USC 7031	Applicable	Protection of migratory birds and their habitats	Migratory bird populations may be present in the vicinity of construction/ remedial action.	2, 3

Table 8. Potential ARARs and TBCs for T Area (Continued)

Regulation or Citation	Status	Synopsis of Regulation or Citation	Reason for Inclusion	Applicable Alternatives
Location-Specific				
Protection of Floodplains 40 CFR 6, Appendix A 10 CFR 1022 SC R.30-11, 12	Applicable	Standards for protection of floodplains.	Much of the TNXOD OU is located in the Savannah River floodplain.	1, 2, 3
Floodplains Executive Order EO 11990	Applicable	Remedial action must minimize the destruction, loss, or degradation of wetlands.	Wetlands are present within the TNXOD OU.	2, 3
Chemical-Specific				
Water Classification and Standards 40 CFR 131 SC R.61-68	Applicable	Official classified water uses for all surface and groundwater. Surface water concentrations must meet the established water quality standards. Groundwater concentrations must meet MCLs unless a Mixing Zone is established for developing alternative compliance levels. Appendices incorporate numeric criteria for surface waters to protect human health and the environment.	Potentially applicable to contaminant concentrations in groundwater and will be considered for contaminants in Inner Swamp surface water. Potential runoff to waters of the state.	1, 2, 3
South Carolina Drinking Water RegulationC R.61-58	Applicable	State regulations implementing MCLs and Maximum Contaminant Level Goals (MCLGs) for drinking water.	Applicable to contaminant concentrations in groundwater.	1, 2, 3
National Oceanic and Atmospheric Administration Threshold Values for Potential Sediment Toxicity	TBC	Threshold values developed for predicting toxicity to organisms exposed to sediment contaminants. The ER-L is the Effects Range-Low value that predicts less than 10% mortality in organisms exposed to these sediment concentrations and the ER-M is the Effects Range-Medium value that predicts greater than 50% mortality in exposed organisms.	To be considered for contaminated sediments and soils that represent secondary sources of contamination and may be transported off-site to surface waters via surface runoff or groundwater in shallow aquifers.	1, 2, 3
Atomic Energy Act 42 USC Sections 2011-2259	Applicable	Governs USDOE use and control of Special Nuclear Materials and their byproducts.	Radioactive materials (e.g., uranium and thorium) in the soil/sediment are included in those which must be managed.	1, 2, 3

CFR = Code of Federal Regulations SCR = South Carolina Regulation USC = United States Code

Table 9. Comparative Analysis of Alternatives for T Area

Evaluation Criteria	Alternative 1 (No Action)	Alternative 2 (Dispose Staged Waste Onsite, Cap Residual Contamination, Place Soil Amendments in Outfall Delta and Inner Swamp, and Implement Institutional Controls)	Alternative 3 (Dispose Staged Waste Offsite, Cap Residual Contamination, Place Soil Amendments in Outfall Delta and Inner Swamp, and Implement Institutional Controls)
Overall Protection of Human Health and the Environment			
Human Health	Not Protective. Would not meet the RAO to protect industrial workers or trespassers.	Protective. Human health RAOs met by institutional controls.	Protective. Human health RAOs met by institutional controls.
Environment	Not Protective. Would not meet the RAO to mitigate leaching.	Protective. Cap and soil amendments would provide infiltration control to meet leachability RAO.	Protective. Cap and soil amendments would provide infiltration control to meet leachability RAO.
Land Use Outcome	Same as current conditions. Waste staged onsite would prevent industrial development.	Available for industrial use with land use restrictions. Not available for residential use.	Available for industrial use with land use restrictions. Not available for residential use.
Compliance with ARARs			
Chemical-, Location-, and Action-Specific	Does not comply.	Complies.	Complies.
Long-Term Effectiveness and Permanence			
Magnitude of Residual Risks	The TBG/Neutralization Sump 678-T may pose a $2x10^{-6}$ risk to a future industrial worker and would pose a leachability threat. Contamination from the X-001 Outfall Drainage Ditch OU removal action ($1x10^{-5}$ industrial worker risk), the Tile Field #2 removal action (leachability threat), and the TNXOD OU removal action (up to $2x10^{-5}$ recreational trespasser risk) would remain staged in T Area. Contamination remaining in the TNXOD OU after the removal action may pose an unacceptable exposure risk to a recreational trespasser and may pose a leachability threat to groundwater. Uncertainty associated with the residual risk posed by some of the building slabs and historical facilities in T Area would not be reduced.	Background levels at surface of cap. Residual risk in the Outfall Delta and Inner Swamp would be in the 10^{-6} range or less, and mitigated by institutional controls. Leachability threats mitigated by cap and soil amendments - continued monitoring would determine if remedy is effective.	Background levels at surface of cap. Residual risk in the Outfall Delta and Inner Swamp would be in the 10^{-6} range or less, and mitigated institutional controls. Leachability threats mitigated by cap and soil amendments - continued monitoring would determine if remedy is effective.

Table 9. Comparative Analysis of Alternatives for T Area (Continued)

Evaluation Criteria	Alternative 1 (No Action)	Alternative 2 (Dispose Staged Waste Onsite, Cap Residual Contamination, Place Soil Amendments in Outfall Delta and Inner Swamp, and Implement Institutional Controls)	Alternative 3 (Dispose Staged Waste Offsite, Cap Residual Contamination, Place Soil Amendments in Outfall Delta and Inner Swamp, and Implement Institutional Controls)
Permanence	There are no remedy components to fail.	Institutional controls needed to maintain cap indefinitely. Some uncertainty with the ability to maintain institutional controls in the long-term. Soil amendments may need to be re-applied periodically.	Offsite disposal would be permanent. Institutional controls needed to maintain cap indefinitely. Some uncertainty with the ability to maintain institutional controls in the long-term. Soil amendments may need to be re-applied periodically.
Reduction of Toxicity, Mobility, or Volume through Treatment			
Degree of Expected Reduction in Toxicity	None. Contaminants are long-lived with negligible decrease due to natural attenuation/decay.	No reduction in Outfall Delta and Inner Swamp. No reduction of toxicity through treatment. Toxicity to receptors in industrialized part of T Area reduced through containment under T Area cap.	No reduction in Outfall Delta and Inner Swamp. No reduction of toxicity through treatment. Toxicity of the X-001 Outfall Drainage Ditch OU, Tile Field #2, and TNXOD OU soil reduced through soil removal and transfer to receiving facility. Remaining toxicity in industrialized part of T Area reduced through containment under T Area cap.
Degree of Expected Reduction in Mobility	None.	Mobility in the TNXOD OU mitigated by runoff controls associated with the cap. Soil amendments would decrease mobility of CM COCs in the Outfall Delta and Inner Swamp. Mobility in industrialized part of T Area reduced through containment/infiltration control under T Area cap.	Mobility in the TNXOD OU mitigated by runoff controls associated with the cap. Soil amendments would decrease mobility of CM COCs in the Outfall Delta and Inner Swamp. Mobility of the X-001 Outfall Drainage Ditch OU, Tile Field #2, and TNXOD OU soil reduced through soil removal and transfer to receiving facility. Residual mobility in industrialized part of T Area reduced through containment/ infiltration control under T Area cap.
Degree of Expected Reduction in Volume	None.	None.	Up to 3,583 m^3 (4,687 yd^3) transferred to receiving facility. This represents a decrease of less than 7% of the total volume of contaminated media in T Area.

Table 9. Comparative Analysis of Alternatives for T Area (Continued)

Evaluation Criteria		Alternative 1 (No Action)	Alternative 2 (Dispose Staged Waste Onsite, Cap Residual Contamination, Place Soil Amendments in Outfall Delta and Inner Swamp, and Implement Institutional Controls)	Alternative 3 (Dispose Staged Waste Offsite, Cap Residual Contamination, Place Soil Amendments in Outfall Delta and Inner Swamp, and Implement Institutional Controls)
Risk to Remedial Workers		None. No onsite work.	Exposure to some radioactive and hazardous substances in soil during construction of the T Area cap. Some heavy equipment use during cap construction.	Exposure to some radioactive and hazardous substances in soil during construction of the T Area cap. Some heavy equipment use during cap construction. Exposure to radioactive and hazardous substances during shipping and disposal of staged wastes.
Short-Term Effectiveness (Continued)				
Risk to Community		None. No offsite work.	None. No offsite work.	Some risk from transportation of contamination over public railways and/or roadways to an off-SRS disposal facility.
Risk to Environment		None. No onsite work.	None. Risk mitigated using standard construction techniques.	None. Risk mitigated using standard construction techniques.
Time Until Protection is Achieved		Protection not achieved.	Approximately 1 year to construct. Protection immediate.	Approximately 1 year to construct. Protection immediate.
Implementability				
Technical Feasibility		Readily implementable – no remedy components.	Readily implementable. Uses standard construction procedures.	Readily implementable. Uses standard construction procedures. Unlikely possibility that waste will not meet waste acceptance criteria of receiving facility.
Administrative Feasibility		No administrative constraints.	No administrative constraints.	Possible public concern with off-SRS transportation of radioactive waste.
Cost (in millions)				
T Area	Capital Cost	$0	$8.0	$11.1
	NPV O&M Costs (annual + periodic)	$0	$3.1	$3.1
	NPV Total Cost	$0	$11.1	$14.3

Table 10. Land Use Controls for the TAOU

Type of Control	Purpose of Control	Duration	Implementation	Affected Areas[a]
1. Property Record Notices[b]	Provide notice to anyone searching records about the existence and location of contaminated areas.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Notice recorded by DOE in accordance with state laws at County Register of Deeds office if the property or any portion thereof is ever transferred to non-federal ownership.	All waste management areas and other areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
2. Property record restrictions[c]: A. Land Use B. Groundwater	Restrict use of property by imposing limitations. Prohibit the use of groundwater.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Drafted and implemented by DOE upon transfer of affected areas. Recorded by DOE in accordance with state law at County Register of Deeds office.	All waste management areas and other areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
3. Other Notices[d]	Provide notice to city &/or county about the existence and location of waste disposal and residual contamination areas for zoning/planning purposes.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Notice recorded by DOE in accordance with state laws at County Register of Deeds office if the property or any portion thereof is ever transferred to non-federal ownership.	All waste management areas and other areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
4. Site Use Program[e]	Provide notice to worker/developer (i.e., permit requestor) on extent of contamination and prohibit or limit excavation/penetration activity.	As long as property remains under DOE control.	Implemented by Doe and site contractors. Initiated by permit request.	Remediation systems, all waste management areas, and areas where levels require land use and / or groundwater restrictions.
5. Physical Access Controls[f] (e.g., fences, gates, portals)	Control and restrict access to workers and the public to prevent unauthorized access.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Controls maintained by DOE.	At select locations throughout SRS.
6. Warning Signs[g]	Provide notice or warning to prevent unauthorized uses.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Signage maintained by DOE.	At select locations throughout SRS
7. Security Surveillance Measures	Control and monitor access by workers/public	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.	Established and maintained by DOE. Necessity of patrols evaluated upon completion of remedial actions.	Patrol of selected area throughout SRS, as necessary.

Table 10. Land Use Controls for the TAOU (Continued)

[a]Affected areas – Specific locations identified in the SRS LUCIP or subsequent post-ROD documents.
[b]Property Record Notices – Refers to any non-enforceable, purely informational document recorded along with the original property acquisition records of DOE and its predecessor agencies that alerts anyone searching property records to important information about residual contamination; waste disposal areas in the property.
[c]Property Record Restrictions – Includes conditions and/or covenants that restrict or prohibit certain uses of real property and are recorded along with original property acquisition records of DOE and its predecessor agencies.
[d]Other Notices – Includes information on the location of waste disposal areas and residual contamination depicted on as survey plat, which is provided to a zoning authority (i.e., city planning commission) for consideration in appropriate zoning decisions for non-DOE property.
[e]Site Use Program – Refers to the internal DOE/DOE contractor administrative program(s) that requires the permit requestor to obtain authorization, usually in the form of a permit, before beginning any excavation/penetration activity (e.g., well drilling) for the purpose of ensuring that the proposed activity will not affect underground utilities/structures, or in the case of contaminated soil or groundwater, will not disturb the affected areas without the appropriate precautions and safeguards.
[f]Physical Access Controls – Physical barriers or restrictions to entry.
[g]Signs – Posted command, warning or direction.

Table 11. Cost Estimate for Alternative 2

Site:	T Area	Description:	Retain staged soil onsite
Location:	SRS		Construct cap in T Area
Phase:	Feasibility Study (-30% to +50%)		Institutional controls
Base Year:	2006		
Date:	May 18, 2004		

CAPITAL COSTS:

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
Miscellaneous Control Items				
Wetlands Permit	1	LS	$25,000	$25,000
Decontamination Pad (36' x 24')				
Construct pad	864	SF	$10.18	$8,796
Decon equipment	240	HR	$35.57	$8,537
Remove pad	864	SF	$6.56	$5,668
Dust Supression	960	HR	$49.82	$47,827
Construction Water and Facilities	1	LS	$24,000.00	$24,000
Erosion Control				
Soil erosion and sediment control plan	1	LS	$16,000.00	$16,000
Install and remove silt fence	3000	LF	$1.13	$3,390
Install and remove hay bales	3000	LF	$10.67	$32,016
Site Surveys				
Topography pre-construction	8.2	AC	$1,692.00	$13,874
Topography as-built	8.2	AC	$1,691.34	$13,869
Survey monuments	66	EA	$104.74	$6,913
SC surveyor	656	HR	$66.18	$43,414
As-built drawings	1312	HR	$56.18	$73,708
Subtotal				$323,012
Geosynthetic Cap over T Area				
Grading Fill/Structural Fill	60800	CY	$12	$729,600
Geosynthetic Clay Layer (GCL) Placement/Testing	348480	SF	$3	$1,045,440
8" Perforated PVC Perimeter Drain	2112	LF	$35	$73,920
Geosynthetic Drainage Layer (GDL) Placement/Testing	348480	SF	$2	$696,960
Vegetative Layer (1.5 ft Common fill + 0.5 ft Topsoil)	25816	CY	$15	$387,240
Backfill Constituent/Inplace Density Testing	1	LS	$25,000	$25,000
Engineering & Design (25% of Direct Capital Costs)	1	LS	$739,540	$739,540
Subtotal				$3,697,700
Broadcasting of Soil Amendments at the TNXOD OU				
Materials	5.7	AC	$1,500	$8,550
Labor	5.7	AC	$18,631	$106,197
Design	5.7	AC	$12,000	$68,400
Subtotal				$183,147
Off-SRS Disposal				
Waste certification sampling (1 per lift liner)	0	EA	$100.00	$0
Laboratory analysis of samples	0	EA	$300.00	$0
Data management	0	LS	$15,000	$0
Data analysis against waste acceptance criteria	0	LS	$30,000	$0
Purchase loading frame	0	EA	$4,611.31	$0
Load liners at railhead	0	EA	$251.72	$0
Rail Car Transport (7 lift liners each)	0	EA	$6,000.00	$0
Solid Rad Waste Disposal	0	CY	$190.00	$0
Subtotal				$0
Institutional Controls				
Institutional Controls Plan	1	LS	$10,000	$10,000
Furnish and Install Signs	50	EA	$150	$7,500
Subtotal				$17,500
SUBTOTAL				**$4,221,359**

Table 11. Cost Estimate for Alternative 2 (Continued)

DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
RadCon	1	LS	$100,000	$100,000
Mobilization/Demobilization - 4% of capital	1	LS	$168,854	$168,854
Project Management - 5% of capital	1	LS	$211,068	$211,068
Construction Management - 6% of capital	1	LS	$253,282	$253,282
Subtotal				$733,204
SUBTOTAL				**$4,954,562**
ESS	14.45%		$715,934	$5,670,497
G&A17.16%		$973,057	$6,643,554	
Contingency	20.00%		$1,328,711	$7,972,265
TOTAL CAPITAL COST				**$7,973,000**
ANNUAL O&M COSTS:				
General Site Maintenance	2	LS	$1,000	$2,000
Annual Cap Maintenance*	0	LS	$5,000	$0
Institutional Controls				
Inspection	2	LS	$500	$1,000
Effectiveness Monitoring				
Collection of groundwater samples (20 wells, 2x/yr)	40	EA	$100	$4,000
Collection of QA samples	14	EA	$100	$1,400
Analysis	54	EA	$350	$18,900
Data Management	1	LS	$15,000	$15,000
Well Maintenance	1	LS	$20,000	$20,000
SUBTOTAL				$62,300
Contingency	20.00%			$12,460
SUBTOTAL				$74,760
Project Management	5.00%			$3,738
Technical Support	10.00%			$7,476
TOTAL ANNUAL O&M COST				$85,974
	Discount Rate		Discount Factor	
PRESENT VALUE ANNUAL O&M COST	3.9%	100 YR	25.082	**$2,157,000**
PERIODIC O&M COSTS:				
COST TYPE	**YEAR**	**QTY**	**UNIT**	**UNIT COST**	**TOTAL**
Five year Remedy Review	5	1	EA	$13,308	$13,308
Periodic repair of cap - 50% of capital cost	30	1	LS	$1,848,850	$1,848,850
Periodic repair of cap - 50% of capital cost	60	1	LS	$1,848,850	$1,848,850
Periodic repair of cap - 50% of capital cost	100	1	LS	$1,848,850	$1,848,850
Replenish amendments - 50% of capital cost	10	1	LS	$91,573	$91,573
Replenish amendments - 50% of capital cost	20	1	LS	$91,573	$91,573
Replenish amendments - 50% of capital cost	40	1	LS	$91,573	$91,573
Replenish amendments - 50% of capital cost	60	1	LS	$91,573	$91,573
Replenish amendments - 50% of capital cost	80	1	LS	$91,573	$91,573
Replenish amendments - 50% of capital cost	100	1	LS	$91,573	$91,573
TOTAL PERIODIC O&M COST					**$6,109,298**
PRESENT VALUE PERIODIC O&M COST		3.9	%		**$965,000**
TOTAL COST[1]					**$11,095,000**

O&M Present Value = Sum $[1/(1+i)^{n_a}]$ x periodic cost] where n_a are the years at which the periodic cost is incurred and interest rate (i) = 3.9%.

* No annual cap maintenance costs are included in this cost estimate because they are included in the TNX Area OU ROD. However, periodic repair of the cap has been included in this cost estimate.

[1]The Total Cost is the sum of the Total Capital Cost, Present Value Annual O&M Cost, and the Present Value Periodic O&M Cost.

(This page intentionally left blank)

Appendix A

USDOE Letter to Regulatory Agencies Documenting the Definition of the TAOU

(This page intentionally left blank)

Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

SEP 2 7 2004

Mr. C. M. Gorman, Manager
Federal Facility Agreement Section
Division of Site Assessment and Remediation
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

Ms. D. C. Taylor
Waste Management Division
United States Environmental Protection Agency, Region IV
61 Forsyth Street, SW
Atlanta, GA 30303

Dear Mr. Gorman and Ms. Taylor:

SUBJECT: T Area Operable Unit (U) CERCLIS Number: 96

As discussed and agreed to by the Core Team during our August 26, 2004 meeting, the United States Department of Energy (USDOE) is submitting this letter to document the agreed upon definition of the T Area Operable Unit (TAOU) as it will be described in the Federal Facility Agreement (FFA). The T Area Operable Unit is the geographic area within the blue line shown on the attached Figure 1. The TAOU includes:

- All the operable units in T Area currently listed on Appendix C of the FFA;
- All the Site Evaluation Areas in T Area currently listed on Appendix G.1 of the FFA;
- All of the T Area building slabs, as subunits of the T Area Operable Unit.

Please see attached tables for the complete listing of operable units, Site Evaluation Areas and building slabs.

The building slabs will be divided into four categories for disposition in the TAOU documentation:

> Category I. Slabs and foundations that have sufficient documentation (historical use, process history, closed under other regulatory authority, etc.) such that they can be determined to not require further evaluation;

Mr. Gorman and Ms. Taylor 2 SEP 2 7 2004

Category II. Slabs and foundations that will be addressed by Decommissioning Project Final Reports, which document a No Further Evaluation or support a remedial decision;

Category III. Slabs and foundations that are recognized as contaminated; and

Category IV. Slabs and foundations that have unanswered questions that require more detailed reporting and study prior to regulatory disposition.

The Savannah River Site has agreed to perform a preliminary sorting of the building slabs based on the TER and Proposed Plan comments received from your agencies. Finally, as agreed to by the Core Team, this strategy is applicable only to the T Area ROD Operable Unit.

Please note that Tables 1 and 2 move the 678-T Neutralization Sump (CERCLIS Number 310) from Appendix G.1 to Appendix C, for inclusion in the T Area Operable unit.

The implementation schedule submitted to your agencies with the Remedial Investigation/Technical Evaluation Report (RI/TER) will be reflected in Appendix E of the FFA upon your approval.

Questions from you or your staff may be directed to me at (803) 952-8365.

Sincerely,

for Brian T. Hennessey
SRS Remedial Project Manager
Soils and Groundwater Project

BTH/HMH:bl
EB-04-312

Enclosures:

1. Figure 1. T Area Operable Unit
2. Table 1. T Area Federal Facility Agreement Operable Units.
3. Table 2. T Area Site Evaluation Areas
4. Draft Appendix J Table 1. T Area Building Slabs

Mr. Gorman and Ms. Taylor 3 SEP 2 7 2004

c: A. B. Gould, USDOE-EQMD, 730-B
B. T. Hays, USDOE, 730-B
P. A. Polk, USDOE-SGP, 730-B
A. M. Godfrey, Chief, DOE Remediation Section, USEPA-IV
R. Pope, USEPA*
K. Davis, Parallax, Inc.*
J. K. Cresswell, SCDHEC-Columbia
J. T. Litton, SCDHEC-Columbia
M. D. Sherritt, SCDHEC-Columbia
G. K. Taylor, SCDHEC-Columbia
Administrative Record File, 730-2B, Room 1000*
* w/enclosure

011462

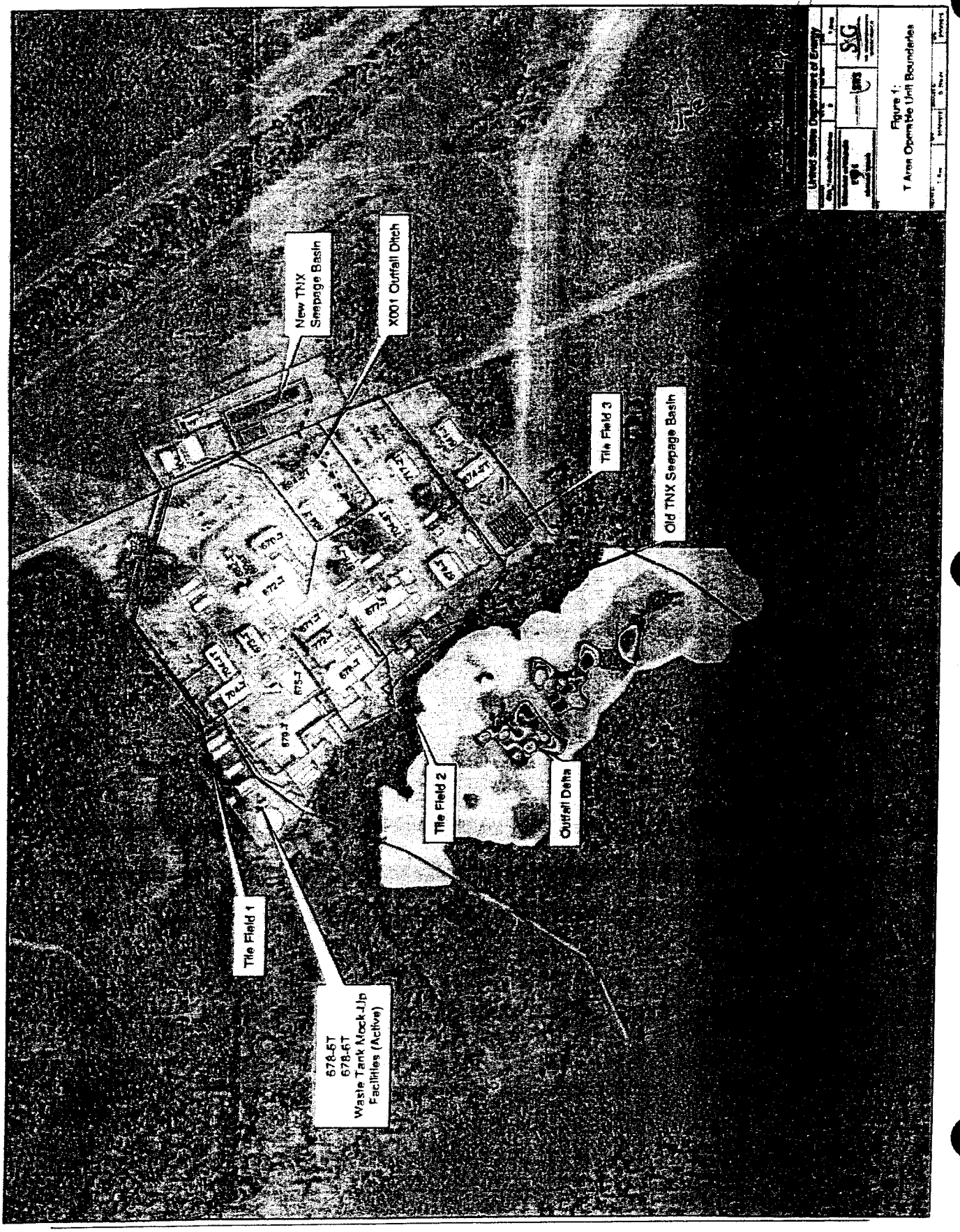

New TNX Seepage Basin
X001 Outfall Ditch
Tile Field 3
Old TNX Seepage Basin
Tile Field 2
Outfall Delta
Tile Field 1
678-6T
678-6T
Waste Tank Mock-Up Facilities (Active)
Figure 1:
T Area Operable Unit Boundaries

Table 1. Federal Facility Agreement Operable Units in T Area

Operable Units (subunits of T Area OU, CERCLIS 96)	SRS ID / CERCLIS #	Status
Neutralization Sump, 678-T	310	Moved from Appendix G.1. Is a subunit of T Area OU
X-001 Outfall Drainage Ditch, NBN	467/96	Removal action (EE/CA), Final action to be specified in T Area ROD
TNX-Area Process Sewer Lines and Tile Fields, as Abandoned, NBN	559/96	Removal action for Tiles Fields (EE/CA), Final action to be specified in T Area ROD
TNX Outfall Delta, Lower Discharge Gully and Swamp, NBN	500/96	Removal action (EE/CA), Final action to be specified in T Area ROD
TNX Area Operable Unit: • New TNX Seepage Basin (and associated inactive process sewer line), 904-102G • Old TNX Seepage Basin (and associated inactive process sewer line) and Upper Discharge Gully, 904-076G • TNX Burying Ground, 643-5G (including Spill on 01/12/53 of 1/2 ton of Uranyl Nitrate, NBN) • TNX Area Groundwater, 082-G NOTE: The Lower Discharge Gully from the TNX OD OU was included in the TNX Area OU for streamlining the remediation.	• 104/21 • 106/21 • 139, 127/21, 29 • 25/21	Three Party Signed Record of Decision (WSRC-RP-2003-4017) issued April 2004

Table 2. Federal Facility Agreement Site Evaluation Areas In T Area

011462

Site Evaluation Area	SRS ID / CERCLIS #	Status
Spill on 07/11/84 of 4 Gallons of Process Solution	NA	No Further Action Approved (Appendix G.2)
Spill on 03/17/88 of <1 Gallon of H_2SO_4	NA	No Further Action Approved (Appendix G.2)
Neutralization Sump, 678-T	310	Sampled in 2003. Moved to Appendix C and included in T Area OU
Sandblast Areas CMT-001 and CMT-002	NA	No Further Action Approved (Appendix G.2)
Spill on 01/12/53 of ½ Ton of Uranyl Nitrate	NA	No Further Action Approved (Appendix G.2)
Combined Spills from 674-T (Boneyard): • 04/05/8950 Gallons of Citrikleen waste solution • 05/22/8950 Gallons of organic waste solution • 05/23/8910 Gallons of precipitate containing sodium tetraphenylborate (NaTPB) • 07/10/901 Pint of precipitate containing sodium tetraphenylborate (NaTPB) • 08/21/901 Gallon of organic waste solution containing mercury • 01/25/9460 Gallons of filtration wash solution • 01/26/941 Gallon of non-hazardous aqueous solution containing Purex sludge • 02/03/94 75 Gallons of tetraphenylborate (TPB) • 02/14/94 20 Gallons of precipitate solution containing benzene and nitrobenzene • 02/15/94 Up to 110 gallons of filtration wash solution • 03/30/94 1 Pint of unkown • 04/29/94 1 Pint of ferric nitrate in acid solution • 10/27/95 1 Pound of nickel nitrate	NA	No Further Action Approved (Appendix G.2)

Table 2. Federal Facility Agreement Site Evaluation Areas in T Area

Site Evaluation Area	SRS ID / CERCLIS #	Status
Combined Spills from 679-T: • 02/07/84 1 Quart of fuel oil • 11/27/84600 Gallons of fuel oil • 01/21/85 Unknown amount of mercury • 01/25/851 Pint of fuel oil • 11/19/85 < 50 Grams of mercury • 11/27/85 <100 Grams of mercury • 05/14/871 Gallon of green colored material (flourescein dye) • 06/13/882 Milliliters of mercury • 02/01/941 Gallon of antifreeze (50% ethylene glycol) • 01/26/95 <0.0625 Pounds of mercury	N/A	No Further Action Approved (Appendix G.2)
Combined Spills from 672-T: • Unknown date 1 Cup of process water • Unknown date 1Quart of ethylene glycol • 06/24/85 ½ Gallon of petroleum product • 08/02/85 <1 Gallon of diesel fuel • 08/22/85 1 Pint of fuel oil • 09/04/85 <1 Quart of motor oil • 12/02/87 <750 Gallons of process water • 06/28/88 ½ Gallon of formic acid drum flush water • 03/08/89 <1 Gallon of precipitate hydrolysis aqueous solution • 04/18/89 <50 Gallons of TOC, benzene, phenols • 04/21/89 50-100 Gallons of dilute melter feed with organics • 12/05/89 3 Gallons of 50% ethylene glycol • 11/20/90 300 Gallons of water • 12/16/93 120 Gallons of process water with mercury • 01/01/94 Unknown amount of mercury contaminated process water • 01/04/94 30 Gallons of melter slurry • 05/18/94 1 Gallon of process vessel vent system condensate • 04/23/96 3 Drops of aqueous waste with Hg	NA	No Action Approved (Appendix G.2)

Appendix J, Table 1. T Area Buildings

BUILDING_NO	STRUCT_NM	In Cap Area?	Regulatory Authority (D&D Model, FFA, Permitted) or General Services	Category			
				Category I - No further investigation	Category II - Addressed by Decommissioning Project Final EIS Report	Category III - Recognized as Contaminated	Category IV - Further Study Needed
53-T	SECURITY SIGN	N/A	General Services	I			
74-1T	STORAGE BUILDING	unknown		?			
80-10T	WASTE TANK SIMULATION (TNX)	Yes		I			
80-14T	CMX-TNX EQUIPMENT STORAGE PAD	unknown		?			
505-T	FIRE ALARM SYSTEM	N/A	General Services	I			
509-T	ENVIRONMENTAL STAGING BUILDING	unknown		?			
603-79T	ROADS-CMX-TNX AREA	N/A	General Services	I			
604-1T	WALKS - CMX - TNX AREA	N/A	General Services	I			
605-1T	FENCES-CMX-TNX AREA	No	Simple-model	I			
607-1T	SEPTIC TANK, ADJACENT TO 679-T	Yes	Permit Closed	I			
607-11T	SEPTIC TANK ADJACENT TO 677-G	Yes	Permit Closed	I			
607-33T	SANITARY LIFT STATION	No	Permit Closed	I			
607-36T	TNX NORTHERN AREA SEPTIC TANK	No	Permit Closed	I			
607-37T	TNX SOUTHERN AREA SEPTIC TANK	No	Permit Closed	I			
607-39T	TNX N AREA SANITARY WASTE LIFT STATION	No	Permit Closed	I			
607-40T	TNX PACKAGED SANIT'RY WASTE TREAT PLANT	No	Simple-model, permit closed	I			
607-41T	TNX SANITARY WASTE CHEMICAL FEED BLDG.	No	Simple-model, permit closed	I			
607-42T	SANITARY LIFT STATION	No	Permit Closed	I			
607-44T	SANITARY LIFT STATION	No	Permit Closed	I			
607-45T	LIFT STATION FOR 672-T	Yes	Permit Closed	I			
607-46T	ORGANIC REMOVAL FACILITY	Yes	Simple-model, permit closed	I			
613-2T	PARKING LOT - CMX AREA	N/A	General Services	I			
623-1T	Actually 623-1G Patrol Radio Transmitter Station (not in T Area)						
641-1T	BUILDING	unknown		?			
643-5T	BURIAL GROUNDS/CMX-TNX & CONTAMIN STOR	Yes (TBG)	TNX Area OU	I			

Appendix J, Table 1. T Area Buildings

BUILDING_NO	STRUCT_NM	In Cap Area?	Regulatory Authority (D&D Model, FFA, Permitted) or General Services	Category			
				Category I - No further investigation	Category II - Addressed in Decommissioning Project Final Report	Category III - Recognized as Contaminated	Category IV - Further Study Needed
651-1T	PRIMARY TRANSFORMER SUBSTATION/681-1G	Thought to be 651-1G (not in T Area)	TSCA managed by SRS PCB Program	I			
652-1T	SUBSTATION FOR 679-T	Yes	TSCA managed by SRS PCB Program	I			
652-2T	SUBSTATION FOR 679-T	Yes	TSCA managed by SRS PCB Program	I			
652-3T	SUBSTATION FOR 679-T	Yes	TSCA managed by SRS PCB Program	I			
652-4T	SECONDARY TRANSFORMER, SUBSTATION NO. 2 TNX	No	TSCA managed by SRS PCB Program	I			
652-5T	SECONDARY TRANSFORMER SUBSTATION #2A	Yes	TSCA managed by SRS PCB Program	I			
652-13T	SECONDARY TRANS. SUBSTATION #3, TNX	No	TSCA managed by SRS PCB Program	I			
652-14T	SECONDARY TRANS. SUBSTATION #4, TNX	Yes	TSCA managed by SRS PCB Program	I			
652-15T	SECONDARY TRANS. SUBSTATION #5, TNX	Yes	TSCA managed by SRS PCB Program	I			
652-18T	SECONDARY TRANS. SUBSTATION #6, 675-T-TNX	Yes	TSCA managed by SRS PCB Program	I			
652-19T	SECONDARY TRANS SUBSTATION #7 677-T TNX	Yes	TSCA managed by SRS PCB Program	I			
652-22T	ELECTRICAL SUBSTATION	Yes	TSCA managed by SRS PCB Program	I			
652-24T	SECONDARY TRANSFORMER SUBSTATION	unknown	TSCA managed by SRS PCB Program	I			
652-25T	ELECTRICAL SUBSTATION	Yes	TSCA managed by SRS PCB Program	I			
652-26T	SUBSTATION	No	TSCA managed by SRS PCB Program	I			
652-32T	SUBSTATION	No	TSCA managed by SRS PCB Program	I			

Appendix J, Table 1. T Area Buildings

BUILDING NO	STRUCT NM	In Cap Area?	Regulatory Authority (D&D Model, FFA, Permitted) or General Services	Category			
				Category I - No further investigation	Category II - Addressed by Decommissioning Project Final Report	Category III - Recognized as Contaminated	Category IV - Further Study Needed
652-33T	SECONDARY TRANSFORMER FOR 904-T	No	TSCA managed by SRS PCB Program	I			
652-34T	75KVA TRANSFORMER	unknown	TSCA managed by SRS PCB Program	I			
652-35T	75kva PAD MOUNTED TRANSFORMER FOR 702-T	No	TSCA managed by SRS PCB Program	I			
652-45T	75 KVA SUBSTATION FOR 702-T	No	TSCA managed by SRS PCB Program	I			
653-T	OUTDOOR PADMOUNTED SWITCHGEAR (RESERVED)	N/A Building Number Reserved, Not U		NA			
654-T	GENERATOR	Yes	Air permitted	I			
654-1T	1000KVA DIESEL GENERATOR	Yes	Air permitted	I			
662-10T	BOAT DOCK FACILITIES-TNX	No	General Services	I			
663-T	BUILDING ALUMINUM #816 (#4088)	N/A		I			
663-1T	BUILDING ALUMINUM #201	N/A		I			
663-2T	BUILDING ALUMINUM #364	N/A		I			
663-3T	BUILDING ALUMINUM #442	N/A		I			
663-4T	BUILDING ALUMINUM #528 (#4073)	N/A		I			
663-5T	BUILDING ALUMINUM #433	N/A		I			
663-6T	BUILDING ALUMINUM #323 (#4082)	N/A		I			
663-7T	BUILDING ALUMINUM #598	N/A		I			
663-8T	BUILDING ALUMINUM #727 (#4079)	N/A		I			
663-9T	BUILDING ALUMINUM #375	N/A		I			
663-10T	BUILDING ALUMINUM #602	N/A		I			
663-11T	CSM10-2 PIPE (#4543)	unknown		I			
663-12T	GRAY'S HANDI-HOUSE (#9173)	N/A		I			
663-13T	HANDI-HOUSE (#53349)	N/A		I			

Appendix J, Table 1. T Area Buildings

BUILDING_NO	STRUCT_NM	In Cap Area?	Regulatory Authority (D&D Model, FFA, Permitted) or General Services	Category			
				Category I - No further investigation	Category II - Addressed by Decommissioning Project Final Report	Category III - Recognized as Contaminated	Category IV - Further Study Needed
663-14T	ROBIN BUILDING #915 (#10184)	unknown		I			
663-15T	HANDI-HOUSE #962	N/A		I			
663-16T	HANDI-HOUSE	N/A		I			
663-17T	HANDI-HOUSE	N/A		I			
663-18T	HANDI-HOUSE	N/A		I			
663-19T	HANDI-HOUSE	N/A		I			
663-20T	HANDI-HOUSE #178 LS2	N/A		I			
663-21T	HANDI-HOUSE #168 CS2	N/A		I			
663-22T	HANDI-HOUSE #301 CS2	N/A		I			
663-23T	HANDI-HOUSE #309 CS1	N/A		I			
663-24T	HANDI-HOUSE IS1	N/A		I			
663-25T	HANDI-HOUSE IS2 068	N/A		I			
663-26T	HANDI-HOUSE #882 CS2	N/A		I			
663-27T	HANDI-HOUSE #325 LS3	N/A		I			
663-28T	HANDI-HOUSE #345	N/A		I			
663-29T	HANDI-HOUSE #391 MWS1	N/A		I			
663-30T	HANDI-HOUSE #512 SMS1	N/A		I			
663-31T	HANDI-HOUSE #313	N/A		I			
663-32T	HANDI-HOUSE #615 LO11	N/A		I			
663-33T	HANDI-HOUSE #431	N/A		I			
663-34T	HANDI-HOUSE PS1	N/A		I			
663-35T	HANDI-HOUSE PS2	N/A		I			
663-36T	HANDI-HOUSE PS3	N/A		I			
663-37T	HANDI-HOUSE ES1	N/A		I			

Appendix J, Table 1. T Area Buildings

BUILDING_NO	STRUCT_NM	In Cap Area?	Regulatory Authority (D&D Model, FFA, Permitted) or General Services	Category			
				Category I - No further investigation	Category II - Addressed by Decommissioning Project Final Report	Category III - Recognized as Contaminated	Category IV - Further Study Needed
663-38T	HANDI-HOUSE	N/A		I			
663-39T	HANDI-HOUSE	N/A		I			
663-40T	HANDI-HOUSE	N/A		I			
663-41T	HANDI-HOUSE	N/A		I			
663-42T	HANDI-HOUSE	N/A		I			
668-T	TNX CONSTRUCTION ADMINISTRATION BUILDING	unknown		?			
669-T	CONSTRUCTION STORAGE & WORK STATION	No		I			
670-T	PILOT PLANT/ROBOTICS BLDG	Yes		I			
671-T	SERVICE TANKAGE FACILITIES, TNX	Yes	Simple-model		II		
671-1T	STORAGE SHED	Yes		I			
672-T	DWPF SEMI-WORKS BUILDING	Yes	Contaminated			III	
672-1T	COOLING TOWER	Yes	Simple-model		II		
673-T	CONTAINERIZATION EQUIPMENT DEV FAC TNX	Yes	Simple-model		II		
673-1T	GAS CYLINDER SHED	Yes (sw corner 673-T)		I			
674-T	CHEMICAL STORAGE FACILITY, TNX	No	Simple-model		II		
674-1T	STORAGE BUILDING	No		I			
674-2T	DWPF CANNISTER STORAGE FACILITY	No		I			
675-T	GLASS MELTER BUILDING	Yes	Simple-model		II		
675-1T	BACKUP GENER POWER STATION/GLASS MELTER	Yes	Air Permitted	I			
676-T	OFFICE FACILITIES	No		I			
676-1T	TEMPORARY OFFICE ANNEX #1, TNX (LEASED)	No		I			
676-2T	"TEMPORARY OFFICE ANNEX #2, TNX (LEASED)"_DELETE	Yes		I			

Appendix J, Table 1. T Area Buildings

BUILDING_NO	STRUCT_NM	In Cap Area?	Regulatory Authority (D&D Model, FFA, Permitted) or General Services	Category			
				Category I – No further Investigation	Category II – Addressed by Decommissioning Project Final Report	Category III – Recognized as Contaminated	Category IV – Further Study Needed
676-3T	TEMPORARY OFFICE ANNEX #3, TNX	Yes		I			
676-4T	MOBILE OFFICE	No		I			
676-6T	MOBILE OFFICE	unknown		I			
676-7T	MOBILE OFFICE	Yes		I			
676-8T	MOBILE OFFICE	No		I			
676-9T	MOBILE OFFICE	Yes		I			
676-10T	MOBILE OFFICE	Yes		I			
676-11T	MOBILE OFFICE	No		I			
676-12T	MOBILE OFFICE	No		I			
676-13T	STORAGE BUILDING	Yes		I			
676-14T	MODULAR OFFICE	Yes		I			
676-15T	MODULAR OFFICE	No		I			
676-16T	PORTABLE COMPUTER ROOM	No		I			
677-T	PILOT PLANT BUILDING	Yes	Contaminated			III	
677-1T	MATERIAL STORAGE BLDG. #1	Yes		I			
677-2T	MATERIAL STORAGE BLDG. #2	Yes		I			
677-3T	TNX PERSONNEL & VISTOR SHELTER	unknown		?			
677-4T	STORAGE BUILDING	Yes		I			
678-T	CHEMICAL SEMIWORKS BLDG (TNX)	Yes	Contaminated			III	
678-1T	MODULAR OFFICE	unknown		I			
678-2T		Yes		I			
678-3T	DRUM STORAGE AREA	Yes		I			
678-4T	Drum Storage Area	Yes		I			
678-5T	SEMIWORKS WASTE TANK MOCK-UP	No		Active			
678-6T	WASTE TANK MOCK-UP RETENTION BASIN	No		Active			
678-7T	STORAGE BUILDING	No					IV
678-8T	OFFICE TRAILER	No		I			
679-T	ENGINEERING TEST FAC. (CMX)	Yes	Simple-model		II		
679-1T	EMERGENCY EQUIPMENT STATION	unknown	General Services Fire Fighting	I			
679-2T	SOLVENT STORAGE SHED	Yes		I			

Appendix J, Table 1. T Area Buildings

BUILDING_NO	STRUCT_NM	In Cap Area?	Regulatory Authority (D&D Model, FFA, Permitted) or General Services	Category			
				Category I - No further investigation	Category II Addressed by Decommissioning Project Final Report	Category III Recognized as Contaminated	Category IV Further Study Needed
679-3T	CHLORINE STORAGE SHED	Yes	General Services Domestic Water	I			
679-4T	DRUM SHELTER	No					IV
679-5T	FIRE FOAM ENGINE HOUSE	Yes	General Services Fire Fighting	I			
679-6T	WEST FIRE PUMP HOUSE	Yes	General Services Fire Fighting	I			
679-7T	WATER SERVICES BUILDING	Yes	Domestic Water Simple-model	I			
679-8T	PUMP HOUSE	Yes	Domestic Water Simple-model	I			
679-9T	BACKWASH SURGE BASIN FOR 679-T	No	General Services Domestic Water	I			
679-10T	MODULAR OFFICE	unknown		I			
679-11T	PROJECT STORAGE SHED	Yes		I			
680-T	PH CONTROL FACILITIES FOR TNX	Yes with water services	General Services Domestic Water	I			
681-T	SEP. SUPPORT BUILDING	unknown		?			
681-4T	WATER PUMP HOUSE FOR CMX	No	Domestic Water Simple-model	I			
682-T	MANUFACTURING BUILDING (PHEF)	Yes	Simple-model		II		
682-1T	STORAGE PAD	Yes		I			
683-T	E4 EVAPORATOR	unknown		?			
684-T	SOLVENT STORAGE BUILDING	No	Simple-model		II		
692-T	ECR/ICR BUILDING	Yes	Simple-model		II		
692-1T	ANALYZER HOUSE	Yes		I			
694-T	CONSTRUCTION BUILDING	No	Simple-model		II		
694-1T	PIPE LAYDOWN AREA	No within Boneyard		I			
694-2T	CARPENTER SHOP	No	Simple-model	I			
697-T	SITE WORK AND GENERAL GRADING	N/A		I			
698-T	LANDSCAPING	N/A		I			

Appendix J, Table 1. T Area Buildings

BUILDING_NO	STRUCT_NM	In Cap Area?	Regulatory Authority (D&D Model, FFA, Permitted) or General Services	Category			
				Category I - No further investigation	Category II - Addressed by the Decommissioning Project Final Report	Category III - Recognized as Contaminated	Category IV - Further Study Needed
699-T	EXTRA MACHINERY (FOR ACCOUNTING PURPOSES ONLY)	N/A		I			
701-1T	Old guard gatehouse buried under present sidewalks			I			
702-T	TELECOMMUNICATION BUILDING	No		Active			
704-T	TNX AREA ADMINISTRATION BLDG.	No	Simple-model		II		
704-1T	TNX ADMINISTRATION BLDG. ANNEX	No	Simple-model		II		
704-2T	CSM7-28 OFFICE	unknown		I			
704-3T	OFFICE TRAILER	No		I			
704-4T	MODULAR OFFICE (#4085)	unknown		I			
704-5T	MODULAR OFFICE (#4087)	unknown		I			
704-6T	TOILET TRAILER	unknown		I			
704-8T	BECHTEL OFFICE BUILDING	No	Simple-model		II		
704-9T	REST ROOM	No		I			
709-1T	HAZARDOUS WASTE REDRUMMING FACILITY	Actually Hazardous Waste Redrumming Facility - Building 709-1N in N Area		NA			
711-T	MECHANICAL SERVICES BLDG (TNX)	Yes	Simple-model		II		
717-1T	WELDING ROD STORAGE BUILDING	unknown		I			
717-2T	MAINTENANCE SHOP	No		I			
761-1T	TNX BONE YARD	No	FFA Site Evaluation Program	I			
761-10T	TNX BONE YARD	No	FFA Site Evaluation Program	I			
772-T	CONSOLIDATED LAB	Yes	Simple-model		II		
772-1T	SATELITE WASTE STORAGE PAD	unknown		I			
782-T	RECIRCULATION WELL	Yes	Used as SVE Well in TNXOU Remedial Action	I			
787-T	HYDROPNEUMATIC TANK	Yes	General Services Domestic Water, SCDHEC permitted	I			
787-2T	LAWN SPRINKLER SYSTEM - TNX	N/A		I			
803-T	AIR LINES	N/A		I			

Appendix J, Table 1. T Area Buildings

BUILDING_NO	STRUCT_NM	In Cap Area?	Regulatory Authority (D&D Model, FFA, Permitted) or General Services	Category			
				Category I – No further investigation	Category II – Addressed by Decommissioning Project Final Report	Category III – Recognized as Contaminated	Category IV – Further Study Needed
805-T	PROCESS WATER LINES	N/A	General Sevices Domestic Water	I			
901-T	WATER LINES	N/A	General Sevices Domestic Water	I			
902-T	FIRE WATER LINES	N/A	General Services Fire Fighting	I			
903-T	SANITARY SEWERS	unknown	Permit Closed	I			
904-T	TNX EFFLUENT TREATMENT PLANT	No	Simple-model permit closed		II		
904-1T	TANK PAD	No			II		
904-10T	Well	No	General Services Domestic Water	I			
904-76T	SETTLING BASIN FOR CTM-TNX	Yes (OTSB)	TNX Area OU	I			
904-102T	RETENTION BASIN, TNX	No (NTSB)	TNX Area OU	I			
905-1T	Water Well	Thought to be 905-1G (not in T Area)		NA			
905-2T	Water Well	Thought to be 905-1G (not in T Area)		NA			
905-3T	Water Well	Thought to be 905-1G (not in T Area)		NA			
905-4T	Water Well	Thought to be 905-1G (not in T Area)		NA			
905-13T	DOMESTIC WATER WELL @ CMX (ABANDONDED)	Yes	General Services Domestic Water	I			
905-96T	DOMESTIC WATER WELL CMX-TNX	No	General Services Domestic Water	I			
905-97T	DOMESTIC WATER WELL CMX-TNX	No	General Services Domestic Water	I			
905-98T	RECOVERY WELL (FORMERLY TRW-1)	Yes	TNX Area OU	I			
905-99T	RECOVERY WELL (FORMERLY TRW-2)	No	TNX Area OU	I			

Appendix J, Table 1. T Area Buildings

BUILDING_NO	STRUCT_NM	In Cap Area?	Regulatory Authority (D&D Model, FFA, Permitted) or General Services	Category			
				Category I - No further investigation	Category II - Addressed by Decommissioning Project Final Report	Category III - Recognized as Contaminated	Category IV - Further Study Needed
905-100T	RECOVERY WELL (FORMERLY TRW-3)	Yes	TNX Area OU	I			
905-101T	RECOVERY WELL (FORMERLY TRW-4)	Yes	TNX Area OU	I			
905-102T	DOMESTIC WATER WELL FOR NAVY TEST AREA	unknown	General Services Domestic Water	I			
906-T	AIRSTRIPPER	Yes	TNX Area OU	I			
NBN1	Low Level Waste Storage Pad	Yes	TNX Area OU located on top of the Old TNX Seepage Basin	I			

(This page intentionally left blank)

Appendix B

Responsiveness Summary

(This page intentionally left blank)

APPENDIX B - RESPONSIVENESS SUMMARY

The Responsiveness Summary serves the dual purposes of (1) presenting stakeholder concerns about the site and preferences regarding the remedial alternatives, and (2) explaining how those concerns were addressed and how the preferences were factored into the remedy selection process. This discussion will cross-reference sections of the Decision Summary that demonstrate how issues raised by the community have been addressed. SRS CAB recommendations or comments made during the public comment period will be summarized and responded to in the Responsiveness Summary.

Responsiveness Summary

The 45-day (or 30-day) public comment period for the Statement of Basis/Proposed Plan (or Proposed Plan) for the TAOU began on May 12, 2005 and ended on June 26, 2005.

Public Comments

No comments have been received from the public.

(This page intentionally left blank)